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FOOD TECHNOLOGY ABSTRACTS

**Vol. 29 No. 2
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**National Information Centre For Food Science And Technology
Central Food Technological Research Institute,
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ABBREVIATIONS

A	ampere
AAS	atomic absorption spectrometry
ADP	adenosine diphosphate
Anon.	Anonymous
AOAC	Association of Official Analytical Chemists
approx.	approximately
atm	atmosphere
ATP	adenosine triphosphate
a_w	water activity
BHA	butylated hydroxyanisole
BHT	butylated hydroxytoluene
BOD	biological oxygen demand
b.p.	boiling point
Btu	British thermal unit
c-	centi- [as in cm, cm ² , cm ³]
cal	calorie
cd	candela
°C	degree centigrade
Ci	curie
CMC	carboxymethyl cellulose
COD	chemical oxygen demand
coeff.	coefficient
conc.	concentrated
concn.	concentration
cv.	cultivar
cwt	hundredweight
d-	deci-
DE	dextrose equivalent
detn.	determination
DFD	dark firm dry
diam.	diameter
dil.	dilute
DM	dry matter, Deutsche Mark
DNA	deoxyribonucleic acid(s)
dyn	dyne
E.	East, Eastern, etc
ECD.	electron capture detection
EDTA	ethylenediaminetetraacetic acid
Eh	oxidation-reduction potential
ELISA	enzyme-linked immunosorbent assay
f-	femto-[10 ⁻¹⁵ , as in fCi]
°F	degree Fahrenheit
FAO	Food and Agricultural Organization
FDA	Food and Drug Administration
FID	flame ionization detection
fl oz	fluid ounce
f.p.	freezing point
ft	foot, feet
g	gram

GC	gas chromatography
gr	gravity
gal	gallon
gf	gram-force
GLC	gas-liquid chromatography
h	hour
ha	hectare
HDPE	high density polyethylene
hl	hectolitre [100 l]
hp	horse power
HPLC	high performance/pressure liquid chromatography
HTST	high temperature short time
Hz	hertz [frequency cycles/s]
in	inch
IR	infrared
IU	international unit
J	joule
k-	kilo- [as in kcal, kg]
K	Kelvin
l	litre
lb	pound
lbf	pound-force
LDPE	low density polyethylene
m-	milli- [as in mg, ml, mm]
m-equiv	milli-equivalent
M	molar concentration
M-	mega- [as in Mrad]
max.	maximum
min	minute [time]
min.	minimum
mol	mole
mol.wt.	molecular weight
m.p.	melting point
MPN	most probable number
MS	mass-spectrometry
n-	nano-[10 ⁻⁹ , as in nm]
N	Newton [kg m/s ²]
N.	North, Northern, etc
N	Normal concentration
NMR	nuclear magnetic resonance
NPU	net protein utilization
oz	ounce
p-	pico- [10 ⁻¹² , as in pCi]
P	Poise
p	probability
Pa	pascal (N/M ²)
PAGE	polyacrylamide gel electrophoresis
PER	protein efficiency ratio
p.p.b.	parts per billion
p.p.m.	parts per million
PSE	pale soft exudative
PTFE	polytetrafluorethylene
PVC	polyvinyl chloride
PVDC	polyvinylidene chloride

qt	quart
R	rontgen
rad	rad or radian
ref.	reference(s)
rev/min	revolutions per minute
RH	relative humidity
RNA	ribonucleic acid(s)
S.	South, Southern, etc.
s.d.	standard deviation
SDS	sodium dodecylsulphate
s.e.	standard error
s	second [time]
SNF	solids-not-fat
sp., spp.	species
sp.gr.	specific gravity
summ.	summary
Suppl.	Supplement
t	metric tonne
temp.	temperature
TLC	thin layer chromatography
TS	total solids
UHT	ultra-high temperature
UV	ultraviolet
V	volt
var.	variety
vol.	volume
v/v	volume/volume
W	watt
W.	West, Western, etc.
WHO	World Health Organization
w/v	weight/volume
wk	week
wt.	weight
yd	yard
yr	year
μ	micro-[as in g, μm]
%	per centum
>	greater than
≥	greater than or equal to; not less than
<	less than
≤	less than or equal to; not greater than

ABBREVIATIONS FOR LANGUAGES

Language of text	
Dutch	Nl
French	Fr
German	De
Italian	It
Japanese	Ja
Norwegian	No
Spanish	Es
Swedish	Sv

JOURNALS SCANNED FOR FTA

ASEAN Food Journal	Cuban Journal of Agricultural Science
Acta Alimentaria	Current Science
Acta Alimentaria Polonica	Dairy and Food Sanitation
Activities Report	Defence Science Journal
Advances in Cereal Science and Technology	Deutsche Lebensmittel-Rundschau
Advances in Enzymology	Developments in Dairy Chemistry
Advances in Food and Nutrition Research	Developments in Food Analysis Techniques
Advances in Food Sciences	Developments in Food Colours
Advances in Lipid Research	Developments in Food Microbiology
Advances in Meat Research	Developments in Food Preservation
Agricultural Situation in India	Developments in Food Proteins
American Scientist	Developments in Food Science
Anales de Bromatologia	Developments in Industrial Microbiology
Analyst (London)	Developments in Meat Science
Andhra Agricultural Journal	Developments in Soft Drink Technology
Animal Science and Technology	Developments in Sweeteners
Applied Microbiology and Biotechnology	Die Nahrung
Applied and Environmental Microbiology	Economic Botany
Appropriate Technology	Enzyme and Microbial Technology
Archivos Latinoamericanos de Nutricion	Ernährungsforschung
Arogya	FAT Science Technology
Australian Journal of Dairy Technology	Fishery Technology
Australian Journal of Plant Physiology	Flour Milling and Baking Research Association
Bangladesh Journal of Scientific and Industrial Research	Bulletin
Beverage and Food World	Food
Bioscience, Biotechnology and Biochemistry	Food Additives and Contaminants
Biotechnology	Food Australia
Biotechnology and Bioengineering	Food Biotechnology
Biotechnology Advances	Food Chemistry
Biotechnology Letters	Food Engineering
Biotechnology Progress	Food Engineering International
British Journal of Nutrition	Food Hydrocolloids
Bulletin of Entomological Research	Food Manufacture
Bulletin of Grain Technology	Food Microbiology
Bulletin of Sciences	Food Microstructure
CRC Critical Reviews in Biotechnology	Food Processing
CRC Critical Reviews in Food Science and Nutrition	Food Production/Management
CRC Critical Reviews in Microbiology	Food Reviews International
CRC Critical Reviews in Toxicology	Food Science and Technology Today
CSIRO Food Research Quarterly	Food Technology
Cafe-Cocoa-The	Food Technology in New Zealand
Canadian Journal of Animal Science	Food Trade Review
Cereal Chemistry	Food and Chemical Toxicology
Cereal Foods World	Food and Cookery Review
Chemical Senses	Food and Nutrition Bulletin
Chemistry and Industry	Food from Poland
Coffee & Cocoa International	Food in Canada
Confectionery Production	Food Research International
	Fruits
	Getreide-Mehl und Brot

Gordian
 Grasas y Aceites
 Hortscience
 Indian Arecanut, Spices and Cocoa Journal
 Indian Baker
 Indian Cashew Journal
 Indian Coconut Journal
 Indian Coffee
 Indian Dairyman
 Indian Farming
 Indian Food Industry
 Indian Food Packer
 Indian Horticulture
 Indian Journal of Agricultural Economics
 Indian Journal of Agricultural Sciences
 Indian Journal of Animal Research
 Indian Journal of Animal Science
 Indian Journal of Biochemistry and Biophysics
 Indian Journal of Dairy Science
 Indian Journal of Environmental Health
 Indian Journal of Experimental Biology
 Indian Journal of Fisheries
 Indian Journal of Horticulture
 Indian Journal of Medical Research
 Indian Journal of Medical Sciences
 Indian Journal of Microbiology
 Indian Journal of Nutrition and Dietetics
 Indian Journal of Poultry Science
 Indian Journal of Public Health
 Indian Journal of Technology
 Indian Miller
 Indian Perfumer
 Indian Spices
 Indian Sugar
 Industria Conserve
 Industrie Alimentari
 Industries Agro-Alimentaires
 Industries Alimentaires et Agricoles
 INFORM
 Insect Biochemistry
 International Bottler and Packer
 International Fruit World
 International Journal for Vitamin and Nutrition Research
 International Journal of Animal Sciences
 International Journal of Food Microbiology
 International Journal of Food Science and Technology
 International Journal of Food Sciences and Nutrition
 International Journal of Refrigeration
 International Pest Control
 International Rice Research Newsletter
 Invention Intelligence

Irish Journal of Food Science and Technology
 Italian Journal of Food Science
 JARQ (Japan Agricultural Research Quarterly)
 Japan Pesticide Information
 Journal of Agricultural and Food Chemistry
 Journal of Animal Science
 Journal of AOAC International
 Journal of Biosciences
 Journal of Cereal Science
 Journal of Chemical Technology and Biotechnology
 Journal of Coffee Research
 Journal of Dairy Research
 Journal of Dairy Science
 Journal of Economic Entomology
 Journal of Fermentation and Biotechnology
 Journal of Food Biochemistry
 Journal of Food Engineering
 Journal of Food Process Engineering
 Journal of Food Processing Preservation
 Journal of Food Protection
 Journal of Food Quality
 Journal of Food Safety
 Journal of Food Science
 Journal of Food Science and Technology (India)
 Journal of General Microbiology
 Journal of General and Applied Microbiology
 Journal of Horticultural Science
 Journal of Industrial Microbiology
 Journal of Insect Physiology
 Journal of Japanese Society for Food Science and Technology
 Journal of Lipid Research
 Journal of Nutrition
 Journal of Nutritional Biochemistry
 Journal of Nutritional Science and Vitaminology
 Journal of Plantation Crops
 Journal of Root Crops
 Journal of Scientific and Industrial Research
 Journal of Sensory Studies
 Journal of Stored Products Research
 Journal of Texture Studies
 Journal of the American Oil Chemist's Society
 Journal of the American Society for Horticultural Science
 Journal of the Indian Chemical Society
 Journal of the Institute of Brewing
 Journal of the Institution of Chemist's (India)
 Journal of the Japanese Society of Starch Science
 Journal of the National Science Council of Sri Lanka
 Journal of the Oil Technologists Association of India
 Journal of the Science of Food and Agriculture
 Journal of the Society of Dairy Technology
 Kenya Coffee
 Khadigramodyog

Lebensmittel- Wissenschaft und - Technologie	Proceedings of the Indian Academy of Science, Section B
Lipids	Proceedings of the Nutrition Society of India
Lipid Technology	Process Biochemistry
Madras Agricultural Journal	Processed Prepared Food
Manufacturing Confectioner	Progress in Food and Nutrition Science
Meat Science	Qualitas Plantarum - Plants Foods for Human Nutrition
Milling & Baking News	Quick Frozen Foods International
Milling Feed and Fertiliser	Research and Industry, India
Mushroom Journal	Revista de Agroquimica Y Tecnologia de Alimentos
Nature, UK	Science (USA)
Netherlands Journal of Agricultural Sciences	Science Reporter
Netherlands Milk and Dairy Journal	Science and Culture
New Scientist	Sciences
New York's Food and Life Sciences	Sciences Des Aliments
Nutrition Reviews	Scientific American
Oils and Oilseeds Journal	Scientific World
Oryza	Seafood Export Journal
Packaging	Sri Lanka Journal of Tea Science
Packaging India	Standards India
Packaging Japan	Starch/Starke
Packaging Week	Tea and Coffee Trade Journal
Paperboard Packaging	Technical Quarterly, Master Brewers Association of America
Perfumer and Flavourist	Technology Review
Pesticide Biochemistry and Physiology	Toxicology
Pesticide Science	Trends in Food Science and Technology
Pesticides Information	Tropical Agriculture
Pest Technology	Tropical Pest Management
Phillippine Journal of Food Science Technology	Tropical Science
Phytochemistry	Two and a bud
PKV Research Journal	VarFoda
Plant Physiology	Voeding
Plant Science	World Coffee and Tea
PORIM Bulletin	World's Poultry Science Journal
Poultry Guide	Zeitschrift Fuer Lebensmittel-Untersch und Forschung
Poultry Science	
Prepared Foods	
Proceedings of the All India Sugar Technologists	
Proceedings of the Indian Academy of Science, Section A	

GENERAL

201

Peri (C). **A hazard analysis model for food processes.** *Food Science and Technology Today* 7(2): 1993; 67-71

Presents a general hazard analysis concept and a methodological scheme, for the application to food processes. The food process hazards (product safety, product quality, energy loss, material loss, time loss, explosions, fire hazards and environmental pollution) are listed. Causes for such hazards are identified and preventive measures are suggested. GS

FOOD PROCESSING

202

Lechowich (RV). **Food safety implications of high hydrostatic pressure as a food processing method.** *Food Technology* 47(6): 1993; 170, 172

Resistance of *Clostridium botulinum* spores to high-hydrostatic-pressure and the food safety considerations and their effects on package/seal integrity, pH changes, possible nutrient changes, enzyme inactivation and possible reactivation at lower temp. used in high-hydrostatic-pressure processes are studied in this article. CSA

FOOD PACKAGING

203

Exama (A), Arul (J), Lencki (RW), Lee (LZ) and Toupin (C). **Suitability of plastic films for modified atmosphere packaging of fruits and vegetables.** *Journal of Food Science* 58(6): 1993; 1365-1370

Suitability of plastic films in standard configuration to maintain modified atm. was evaluated for common fruits and vegetables. Most films did not result in optimal O₂ and CO₂ atm., especially when produce had high respiration. Produce with low and medium

respiration could be matched with films considering O₂ permeability requirements alone. MA packaging systems designed to produce optimal oxygen at suitable temp. could have complications from transient temp. increases during storage and/or transportation. Respiration rates of fruits and vegetables increase more with temp. than do gas permeabilities of films. Higher than optimum temp. could cause anoxia and seriously damage produce. More permeable gas pathways and temp. compensation to equalize Q₁₀ values are needed for MA packaging systems to function effectively. AA

204

Townshend (GK). **Packaging management.** *Packaging India* 26(2): 1993; 5,7

This article deals with the issues of free trade and environmental crunch. On the environmental issue (1) source reduction in terms of lightweighting and substitution and (2) waste management-legislation, recycling have been dealt with. RN

205

Swinton (H). **Common misconception about packaging waste management.** *Packaging India* 26(2): 1993; 29, 31

This is a report on results of the survey conducted by Recycle NSW into house hold garbage. Deals with promotion and benefits of recycling. RN

206

Ishitani (T). **Fresh fruits and vegetables: The present state and problem of freshness preservation from the viewpoint of packaging technology.** *Packaging Japan* 44(7): 1993; 30-37

The review deals with quality elements and freshness of produces. Basis on freshness preservation of fruits and vegetables and their problems, trend in development of technology on freshness preservation of products, development of plastic films for freshness preservation, problems about freshness preservation and its future trend and data necessary for freshness preservation.

packaging of fruits and vegetables. 10 references. RN

207

Sudhakar (G). **Bulk packaging of tea.** *Packaging India* 26(4); 1993; 14-16

Aspects described in this article are the disadvantages of conventional packing of tea, the design of bulk packaging system ideal for tea packing, its application in tea industries, the advantages of jumbo bags (Flexible Intermediate Bulk Containers FIBC)), the functions of jumbo bags and the results of filling FIBCs. CSA

208

Dasgupta (P). **Tea packaging - overview.** *Packaging India* 26(4); 1993; 17-18

The article presents an overview of the different forms of tea packing (bulk tea and packet tea), types of packages, functions of packaging (keep, protect and preserve), various packaging materials that are being used for packet tea, protection required for tea against moisture pick up, flavour loss, odour contamination, selection of packaging materials, possible damages on primary and secondary packaging materials and packaging machineries such as cartons, flexible pouches and soft pack. CSA

209

Varma (S). **Bag-in-box and lined cartons for tea packaging - a general appraisal.** *Packaging India* 26(4); 1993; 19, 21-23

Aspects covered are the evolution of bag-in-box package, the difference between lined cartons and bag-in-box, the basic cost of the cartons, manufacturers of lined cartons, filling and sealing, pack closures, mechanical handling of tea, packaging machinery for bag-in-box, weighers and lined cartons. CSA

210

Mukherjee (S). **Package in marketing.** *Packaging India* 26(4); 1993; 27-29

An analytical structure of the two dimensions of packaging such as functional objective (form/shape, convenience in usage, keeping

quality, economy) and non-functional or subjective (appeal, image, culture, psychography) is described. The physical and subjective factors affecting the primary (mini chests/jumbo bags and pet jars) and secondary packaging of tea is also covered in this article. CSA

211

Mitra (KK). **Alternative packaging for tea.** *Packaging India* 26(4); 1993; 31, 33-35, 37

Various alternatives for packaging of tea are corrugated cardboard boxes, multiwall paper sacks, rigid containers made of chip board and hard board, sacks of jute canvas with inner lining of plastic film. The present paper describes the basic design aspects of some of the alternative packaging systems which appear to have potentials for replacing the conventional plywood tea chests and also discusses the functional suitability of those systems. CSA

212

Cooper (BPW). **Bulk packaging of tea in flexible packaging for exports.** *Packaging India* 26(4); 1993; 39, 41-43, 45, 47

213

Narayanan (PV). **Quality assurance and eco-friendly packaging.** *Packaging India* 26(5); 1994; 5, 7-9

The major aspects dealt in this article are the quality assurance of packaged products, the coverage and objectives of ISO 9000, eco-friendly packaging and eco-regulations. CSA

214

Tiannan (X). **The recycling and remaking UBCs into packaging containers.** *Packaging India* 26(5); 1994; 23, 25, 27, 29, 31, 33

Aspects dealt in this article are the consuming of two-piece cans, the recycling and remelting of used beverage cans (UBCs) in the United States, China and other countries, the legislation for the recycling of UBCs, the automatic recycling machinery of UBCs, the remarking and processing of UBCs into

packaging containers, the proposals for developing a set of facilities for the remaking and reusing of UBCs, uses of packaging cans in packaging of paints, poster colours, coating, dyestuff, binder, seeds, washing powder, small hardware spares etc. CSA

FOOD ENGINEERING AND EQUIPMENT

215

Sakai (N) and Hayakawa (K-I). **Heat and moisture transfer in composite food - theoretical analysis of influence of surface conductance and component arrangement.** *Journal of Food Science* 58(6); 1993; 1335-1339

Heat and moisture transfer in composite bodies undergoing drying was simulated using a previously developed mathematical model which included the chemical potential of moisture as a mass transfer potential. Composite bodies included layered cylinders and concentric spheres consisting of a starch granule hydrate (H) and a hydrate of starch granules-sucrose 3:1 mixture (S). The influence of the following factors on heat and moisture transfer was examined: convective surface mass transfer conductance, initial moisture, and component arrangement. The 3 factors significantly influenced moisture transfer while they had slight influence on heat transfer. Overall drying rate of each composite body was influenced interactively by moisture fluxes, which were caused by a surrounding drying medium and by a mass transfer potential difference across the interface of H and S. AA

216

Wang (J) and Hayakawa (K-I). **Maximum slope method for evaluating thermal conductivity probe data.** *Journal of Food Science* 58(6); 1993; 1340-1345

The max. slope method (MAS) was verified theoretically and experimentally and compared with other data reduction methods: time correction factor method (TIC) and maximum r^2 method (MAR). Glycerol (99.5% pure) and agar gel (0.5%) were used as test materials. The max. errors of glycerol k-values determined from experimental data applying the MAS, TIC

and MAR were 2, 0.7 and 3% respectively. Those of agar gel k-values determined by the same methods were 1, 1 and 0.8% respectively. An advantage of the MAS method is that it does not require probe calibration and there is no need for reference material suitable for each k-detn. of different test samples. GS

217

Park (HJ), Weller (CL), Vergano (PJ) and Testin (RF). **Permeability and mechanical properties of cellulose-based edible films.** *Journal of Food Science* 58(6); 1993; 1361-1364, 1370

Factors affecting barrier properties [oxygen permeability (OP) and water vapour permeability (WVP)] and mechanical properties [tensile strength (TS) and elongation (E)] were investigated for methyl cellulose (MC) and hydroxypropyl cellulose (HPC) films. OP, WVP and TS of MC and HPC films increased as the mol. wt. (MW) of the cellulose increased. E of MC films increased as MW increased, but E of HPC films was highest for the intermediate MW of 370,000. OP, WVP and TS of MC films were not a function of thickness, but E slowly increased as film thickness increased. OP and WVP of HPC films were not relatable to film thickness, but TS and E of HPC films slowly increased as film thickness increased. TS decreased and E increased for both film types as concn. of plasticizers was increased. Plasticizers enhanced or retarded OP and WVP of cellulose-based films, depending on their concn. AA

218

Padua (GW). **Microwave heating of agar gels containing sucrose.** *Journal of Food Science* 58(6); 1993; 1426-1428

A mathematical model was developed for predicting the temp. profiles of cylindrical samples of sucrose containing agar gels heated by microwaves. Temp. was modeled in terms of dielectric properties of gels and the power absorbed by the sample. Experimental corroboration of the predicted temp. was obtained by microwave heating cylindrical gels of 2% agar containing 0, 40 and 60% sucrose. The levels of sucrose in the gels notably affected the temp. profiles in the cylinders. Samples

with no sucrose showed a pronounced central heating effect. 40% sucrose samples showed a early uniform heating profile and 60% sucrose samples showed surface heating. AA

219

Abbatemarco (C) and Ramaswamy (HS). **Heating behaviour and quality factor retention in a canned model food as influenced by thermal processing in a rotary retort.** *Journal of Food Quality* 16(4): 1993: 273-285

Heat penetration data was obtained on a canned model food (gelatinized starch) processed in a rotary retort under temp. 110-130°C; rotation speed 10-20 r.p.m., can headspace 6.4 - 12.8 mm and starch concn. 3.4%. Apparent viscosity and hunter L, a and b values were obtained before and after each run. The % of selected nutrients, colour retained at each processing condition was estimated. All factors except headspace were found to influence significantly the heating behaviour as higher temp. and rotation speeds retained quality factors better and reduced the process time. SD

220

Mertens (B) and Deplace (G). **Engineering aspects of high-pressure technology in the food industry.** *Food Technology* 47(6): 1993: 164-169

Knowledge of the requirements of high-pressure processes (cold isostatic pressing, warm isostatic pressing and hot isostatic pressing) that can lead to the development of foods with high nutritional and sensory quality and other desirable properties in dealt in this article. The crucial requirements for the commercial application of high-pressure technology in the food industries such as capacity of the high pressure vessels, cycling time, process control, safety, sanitation, cleaning and disinfection, package design, investment cost and identification of feasible applications are also discussed. CSA

221

Knorr (D). **Effects of high-hydrostatic-pressure processes on food**

safety and quality. *Food Technology* 47(6): 1993: 156, 158-161

This article briefly reviews some of the high-pressure-related research activities on food safety issues, quality and functionality aspects and process development opportunities such as UHP blanching and secondary metabolite release. 36 references. CSA

222

Maesmans (G), Hendriks (M), De Cordt (S) and Tobback (P). **Theoretical considerations on design of multicomponent time temperature integrators in evaluation of thermal process.** *Journal of Food Processing Preservation* 17(5): 1993: 369-389

The use of time temp. integrators (TTIs) as an alternative means of process evaluation, besides *in situ* process monitoring and the physical mathematical method has received lot of attention. Multicomponent TTIs have been suggested to evaluate the integrated impact of time and temp. on a target quality attribute. The question how from the combined reading of these individual systems, the impact of the heating process on a target quality parameter can be predicted has not yet been answered. In this theoretical study, the restriction of two interpolation methods are critically considered in determining the impact on a target quality attribute from the reading of three other temp. sensitive systems. Possibilities of the 'equivalent point method' and a polynomial expression as interpolation method are tested. Since only limited information is available on the product temp. history in processing conditions when TTIs are used in applying these interpolations. A single-component TTI with an activation energy (0 - Z value) identical to the target quality attribute activation energy (Z value) may be preferable to estimate the impact of the thermal treatment. RN

223

Harkonen (H), Koskinen (M), Linko (P), Siika-aho (M) and Poutanen (K). **Granulation of enzyme powders in a fluidized bed spray granulator.** *Lebensmittel-Wissenschaft und -Technologie* 26(3): 1993: 235-241

In order to improve the handling properties of a fine enzyme powder the increasing of particle size by granulation was studied. Enzyme powders were granulated in a fluid bed granulator. Sodium chloride powder was used as a filler material, but in some cases no filler was used. In the first part of the study the granulation properties of the fine NaCl powder were studied. The particle size of the salt granules obtained was increased by 3 process parameters: increasing the concn. of the binder in the spraying sol., increasing the spraying rate of the binder sol. and lowering the temp. of the fluidizing air. When an enzyme powder was granulated it was observed that the largest granules were obtained when the filler material was mixed with the dry powder. The mean particle size in these types of granulated powders ranged from 135 to 200 μm . When the filler was added to the enzyme concentrate prior to drying the increase in particle size during the granulation process was negligible and the mean particle size was only slightly greater than 60 μm . The flowing properties of the enzyme granules were more easily improved than their wettability. The decrease in bulk density as a consequence of granulation was between 20 and 40%. AA

Equipments

224

Gliese (J). **On-line sensors for food processing.** *Food Technology* 47(5); 1993; 88, 90-95

This article presents an overview of some of the instruments and sensors (ion-selective electrodes, field effect transistors and metal oxide gas) for on-line compositional monitoring of food quality factors. A report on the development and principles of operation for (1) biological and chemical sensors; (2) near-infrared reflectance and transmission analyzers for moisture and compositional measurement; (3) process refractometers for measurement of solids content; and (4) microwave and radio frequency measurement of food moisture is also presented. CSA

225

Zimmerman (F) and Bergman (C). **Isostatic high-pressure equipment for food**

preservation. *Food Technology* 47(6); 1993; 162-163

Discusses the engineering design of isostatic high-pressure equipment for safe, durable and reliable operation for food preservation. Emphasis is placed on prestressed wire-wound pressure vessels. CSA

ENERGY IN FOOD PROCESSING

Nil

FOOD CHEMISTRY AND ANALYSIS

Chemistry

226

Wolters (MCE), Diepenmaat (HB), Hermus (RJJ) and Voragen (AGJ). **Relation between *in vitro* availability of minerals and food composition: A mathematical model.** *Journal of Food Science* 58(6); 1993; 1349-1355

A mathematical model was developed to describe the relative influence of phytic acid, dietary fiber components, oxalic acid, citric acid and ascorbic acid on *in vitro* availability of Ca, Mg, Fe, Cu and Zn. The model was based on a combination of interdependent Langmuir isotherms. Throughout a diverse set of food products (cereal products, fruits, vegetables and nuts), the mathematical model described and predicted *in vitro* availability of Ca, Mg, Fe and Zn well ($r = 0.89, 0.87, 0.90$ and 0.92 respectively). The model proved valuable in studying simultaneous effects of food components on *in vitro* availability of minerals and trace elements in foods. Therefore, the mathematical model should help relate *in vitro* simulations to *in vivo* experiments. AA

227

Buera (MDP) and Karel (M). **Application of the WLF equation to describe the combined effect of moisture and temperature on non-enzymatic browning rates in food**

systems. *Journal of Food Processing Preservation* 17(1); 1993; 31-45

Nonenzymatic browning rates of several vegetables, dairy products and model food systems stored at different moisture contents and temp. were analysed and related to their glass transition temp. (T_g). The data analysed corresponded to a region of moisture content in which effects due to reactant diffusion could be expected. As changes in diffusion constants may in turn, be related to glass transition, the Williams-Landel-Ferry (1955) (WLF) equation was to describe the combined effects of moisture and temp. on the nonenzymatic browning rate constants. Ferry's (1980) procedure of reduced variables utilizing a reference temp. (T_0) was applied, the T_0 selected within the experimental range. In this procedure, the equation coefficients are calculated for the equation using T_0 . Then they are recalculated by shifting the selected reference temp. to T_g to obtain the coefficients with reference to T_g . The resulting equation can be applied to relate the browning rate constants to temp., moisture and T_g . The equation has predictive value and the method avoids extrapolations when data at T_g are not available. AA

228

Walstra (P) and de Roos (Al). **Proteins at air-water and oil-water interfaces: Static and dynamic aspects.** *Food Reviews International* 9(4); 1993; 503-525

Proteins are very surface-active substances, and they readily adsorb onto o/w interfaces even in very low concn. Various interfacial properties resulting from their adsorption are briefly reviewed in relation to formation and stability of emulsions and foams. Displacement from the interface by small-molecule surfactants is discussed. It concludes that most effects of adsorbed proteins on the various kinds of physical instability of emulsions and foams are semiquantitatively understood, but variation among proteins in the production of small droplets and bubbles during emulsification and foaming, respectively still defies explanation. 42 references. SRA

229

Belton (PS). **New methods for monitoring changes in proteins.** *Food Reviews International* 9(4); 1993; 551-573

The techniques discussed in this review is nuclear magnetic resonance, (protein structures in sol., relaxation time measurements, high-resolution solid-state NMR, infrared and Raman methods, probe microscopy). 50 references. SRA

230

Balny (C) and Masson (P). **Effect of high pressure on proteins.** *Food Reviews International* 9(4); 1993; 611-628

This paper reviews some basic knowledge on the effects of high pressure on proteins. Aspects covered include, general thermodynamic considerations on the effects of pressure on protein, origins and consequences of pressure effects on proteins (pressure effects on elementary interactions, pressure effects on the structure of proteins, stability zones, effects of pressure on protein functions, protein biosynthesis, sol-gel transitions), methods for studying proteins under pressure. (spectroscopic methods, electrophoresis, rapid mixing methods and diamond anvil cell). 78 references. SRA

Chemistry(Analytical)

231

Reisterer (KM), Zottola (EA) and Rulcher (RG). **Mapping protein foulants on polysulfone membranes using microspectrophotometry.** *Food Technology* 47(5); 1993; 104-108

The use of microspectrophotometry to analyze the distribution and concn. of protein, the major foulants encountered in the fouling of polysulfone membranes used in ultrafiltration concn. of milk is discussed in this article. The study demonstrates the direct correlation of higher absorbance in areas where foulants were present in greater concn. CSA

232

Kretzschmar (H-J) and Neyen (V). **Analysis of N-phenyl-N'-(1,3-dimethylbutyl)-p-phenylenediamine (6PPD) in aqueous migrates of**

rubber articles in contact with food. *Deutsche Lebensmittel-Rundschau* 88(12); 1992; 387-390 (De)

The present paper describes a new HPLC-method for detn. of N-phenyl-N'-(1,3-dimethylbutyl)-p-phenylene diamine (6PPD). Because of low concn. in aqueous migrates a selective enrichment by using of solid phase extraction (SPE) is indispensable. 6PPD is separated completely from other coelutents in a relative short time by gradient elution with acetonitrile/phosphate buffer and is determined quantitatively by using an external standard. AA

233

Montanari (I), Fantozzi (P) and Pedone (S). **Tobacco fraction 1 protein (F₁P) utilization for oral or enteral feeding of patients. 1. Heavy metal evaluation.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 259-263

Tobacco leaf proteins are currently being studied for their possible use in human nutrition and in therapeutics. In the latter, it is compulsory to test the presence and levels of contaminants. This paper evaluates the presence of the principal heavy metals in the Tobacco Fraction 1 Protein (ribulose-1,5-diphosphate carboxylase) and compares the amounts with the provisional max. tolerable daily intake [(P)MTDI] and the provisional tolerable weekly intake (PTWI) in diets for comatose and nephrotic patients. AA

234

Wu (SY) and Brewer (MS). **Screening antioxidative and prooxidative activity in a solid medium model system.** *Journal of Food Biochemistry* 17(1); 1993; 1-13

The antioxidant screening method (based on solid medium composed of linoleic acid, Triton X-100 and thioharbituric and solidified with agar in a petriplate) allows single sample preparation and rapid detn. of antioxidant or prooxidant activity. Lipid peroxidation can be observed colorimetrically and potential antioxidants can be selected using these techniques. GS

235

Ramalakshmi (K), Prabhakara Rao (PG) and Abraham (KO). **Chemical analysis of chicory samples.** *Indian Coffee* 43(3); 1994; 22-24

Bureau of Indian Standards in collaboration with Coffee Board and CFTRI screened the various commercial samples of chicory (*Cichorium intibus*) powder to update the data on chemical composition and for needful changes in the specification. All the samples confirmed to ISI specifications in respect of total ash (3.5 - 8.0%), acid insoluble ash (max. 1.5%) and water soluble matter (60% min.). The moisture content of 2 samples marginally exceeded the prescribed limit of 10%. SRA

FOOD MICROBIOLOGY AND HYGIENE

236

Castro (AJ), Barbosa-Canovas (GVB) and Swanson (BG). **Microbial inactivation of foods by pulsed electric fields.** *Journal of Food Processing Preservation* 17(1); 1993; 47-73

Pulses of high voltage electric fields (PEF) are potentially a most important cold pasteurization/sterilization food preservation technique to replace or partially substitute for thermal process. During PEF process, lysis of microorganisms is caused by irreversible structural changes in the membranes, leading to pore formation and destruction of the semipermeable barrier of the membrane. Theories explaining electroporation of the cell membrane and application of non thermal PEF process are reviewed in this paper. 59 references. RN

237

Hoover (DG). **Pressure effects on biological systems.** *Food Technology* 47(6); 1993; 150-155

Aspects reviewed in this article are: history of hydrostatic processing, effect of biospheric pressures on microorganisms, effect of hydrostatic pressure on microorganisms, effects on enzymes and other proteins. 30 references. CSA

Enzymes

238

Jaffar (mB) and Oommen (S). **Production, preservation and characterization of pectin methylesterase (PME) from *Arthrobotrys oligospora*.** *Journal of Food Biochemistry* 17(1); 1993; 53-65

The production, purification and characterization of pectin methyl esterase (PME) from a nematophagous fungus, *Arthrobotrys oligospora* was studied. PME was stable between pH values of 5-8. Its optimum activity was at pH 7.5 and at 37°C. The energy of activation (E_a) was determined to be 11.9 kcal/mole. It had k_m of 0.9 mg/ml for pectin. The PME had a mol. wt. of 50 kg daltons. GS

Microorganisms

Bacteria

239

Grant (KA) and Kroll (RG). **Molecular biology techniques for the rapid detection and characterisation of foodborne bacteria.** *Food Science and Technology Today* 7(2); 1993; 80-88

Molecular techniques discussed briefly include: conventional methods, alternative rapid methods, molecular methods (DNA/RNA probe methods) hybridisation methods (detection methods, molecular finger printing methods), molecular technique in use, amplification methods - the polymerase chain reaction and other amplification techniques and application to food samples. BV

240

Ishibashi (N) and Shimamura (S). **Bifidobacteria: Research and development in Japan.** *Food Technology* 47(6); 1993; 126, 129-130, 132, 134

Bifidobacteria research in Japan shows that majority of the proposed physiological effects of bifidobacteria pertain to improvement of intestinal flora by preventing colonization of pathogens, amelioration of diarrhea or

constipation and immunity activation. Other effects include vitamin production and antitumor activity. Administration of bifidobacteria through various bifidus products such as yoghurt, fermented milk, lactic-acid bacteria beverages, fresh milk products, powdered milk products, confectionery and health foods that are on market in Japan is discussed in this article. CSA

241

Nerbrink (E) and Borch (E). **Evaluation of bacterial contamination at separate processing stages in emulsion sausage production.** *International Journal of Food Microbiology* 20(1); 1993; 37-44

242

Peterz (M) and Steneryd (AC). **Comparative evaluation of two methods of enumerating enterococci in foods: Collaborative study.** *International Journal of Food Microbiology* 18(3); 1993; 211-221

Slanetz and Bartley's (SB) method were applied for comparison on 13 lab. tested 4 blind duplicate food samples containing different levels of enterococci and 2 negative control samples. Freeze-dried mixtures of bacteria were used as simulated food samples (reconstituted and either spread directly on the surface of (SB) medium and incubated at 44°C for 48 h or preincubated in tryptone soya agar at 37°C for 2 h before overlaid by SB and incubated at 37°C for further 46 h). The numbers CFU of enterococci recovered by the 2 methods were not significantly different except for one sample where the 37°C method gave higher recovery. The 44°C method was less time consuming and less laborious. SRA

Staphylococcus aureus

243

Valik (L) and Gorner (F). **Growth of *Staphylococcus aureus* in pasta in relation to its water activity.** *International Journal of Food Microbiology* 20(1); 1993; 45-48

Yersinia enterocolitica

244

Hudson (JA). **Construction and comparison of response surface kinetic model for the *Yersinia enterocolitica* type strain and a food isolate under aerobic conditions.** *International Journal of Food Microbiology* 18(3); 1993; 201-209

Response surface models were constructed for the type strain of *Yersinia enterocolitica* (ATCC 9610) and a wild type strain isolated from sliced roast lamb, for various conditions of temp., pH, sodium chloride concn. and sodium nitrite concn. Both strains grew at similar rates except at the 'extremes' of the conditions tested. Models for both quadratic and cubic polynomial equations are shown. The results obtained indicate that the cubic model is superior. AA

Fungi

245

Schmitz (S), Weidenbomer (M) and Kunz (B). **Heavy metals as selective inhibitors of mould growth.** *International Journal of Food Microbiology* 18(3); 1993; 233-236

Ten heavy metals were tested in malt extract agar for their inhibitory activity on 9 food relevant fungi *Trichoderma harzianum*, *Alternaria alternata*, *Fusarium oxysporum*, *F. culmorum*, *Mucor circinelloides*, *Rhizopus stolonifer*, *Cladosporium cladosporoides*, *Aspergillus versicolor*, *Penicillium citrinum*. CoSO_4 (0.1%) and NiCl_2 (0.1%) were found to inhibit *F. oxysporum* and *P. citrinum* 1% concn. of CoSO_4 and $\text{C}_4\text{H}_6\text{O}_4\text{Pb}$ inhibited the growth of all the fungi tested. MnSO_4 inhibited slow growing fungi like *C. cladosporoides* and *A. versicolor*. Rapidly growing fungi viz. *M. circinelloides* and *R. stolonifer* were suppressed by all compounds. NiCl_2 was found to be suitable for growing selectively *P. citrinum*. The variations observed as growth inhibitory for heavy metals investigated indicated good possibility for designing selective media. BV

Agaricus bisporus

246

Mau (J-L), Beelman (RB) and Ziegler (GR). **Preparation, purification and identification of 10-oxo-trans-8-decenoleic acid from the cultivated mushroom *Agaricus bisporus*.** *Journal of Food Biochemistry* 16(6); 1993; 371-388

10-Oxo-trans-8-decenoleic acid (ODA) was produced by homogenizing mushrooms (*A. bisporus*) in phosphate buffer with added linoleic acid, extracted from the supernatant after centrifugation and purified using column and thin-layer chromatography. Using UV, infrared and MS and NMR spectroscopy, the purified compound (97.5% ODA) was characterized as a white, waxy solid with apK_a of 4.68. GS

Aspergillus parasiticus

247

Luchese (RH) and Harrigan (WF). **Influence of pH and lactic acid on the levels of glucose needed to induce aflatoxin production in *Aspergillus parasiticus*.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 242-250

Aflatoxin production has been conditioned to the presence of a readily metabolizable sugar source. To evaluate the influence of pH and acid on the levels of glucose needed to induce aflatoxin production, a transfer technique of pre-grown mycelia coupled with the use of a protein synthesis inhibitor was employed. The results indicate that the major role of pH is related to the initial events of the synthesis. Hydrochloric acid and lactic acid had little effect. Aflatoxin yields between cultures of the same initial pH were directly correlated with the glucose content to which the mycelia were exposed during preincubation period. Nevertheless, glucose was not a limiting factor for aflatoxin synthesis to occur. The requirement for glucose was also dependent on the composition of the media employed. Apparently, the non-requirement of glucose in Lab-Lemco Tryptone Broth was related to factors existing in the yeast extract component. The findings suggests that more than one mechanism might be involved in the induction of aflatoxin synthesis. AA

Trichoderma viride

248

Gervais (P), Marechal (PA) and Voirin (I). **Medium hydration effects on the growth of *Trichoderma viride*.** *Journal of Food Science* 58(6); 1993; 1346-1348

The hydration of gelled substrates was examined in relation to growth of the filamentous fungus *Trichoderma viride*. An experimental plan was designed to discriminate between the effects of thermodynamic (a_w) and kinetic parameters (water content) on fungal growth. At a set thermodynamic level of water (a_w), the decrease in water content caused by adding silica gel to the medium proved limiting to fungal growth. This limitation was attributed to diffusion as shown by experimental detn. of rotational and translational diffusivities of glucose in such media. AA

Yeasts

Candida cacaoi

249

Dridier (D), Chemardin (P), Arnaud (A) and Galzy (P). **Isolation and characterization of the exocellular β -glucosidase of *Candida cacaoi*: Possible use in carbohydrates degradation.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 198-204

The present paper reports the study and purification of the exocellular β -glucosidase of *Candida cacaoi*. This enzyme was purified by ion exchange chromatography and by gel filtration. Its mol. wt. was estimated at 440 kDa. The oligomeric structure was determined following treatment of the purified enzyme with dodecyl sulphate (SDS). The structure is composed of 4 identical subunits of 110 plus or minus 10 kDa. Its optimal temp. is 55°C, and the optimum pH is 4. The enzyme is active against all the glucosides with the following configuration: $\beta(1-2)$, $\beta(1-3)$, $\beta(1-4)$, $\beta(1-6)$, $\alpha(1-4)$ and $\alpha(1-6)$. These results could justify the utilization of the enzyme in the liberation of terpenols from terpenyl glucosides. This

enzyme is constitutive and repressed by glucose. AA

Rhodotorula rubra

250

Oxen (P) and Knorr (D). **Baroprotective effects of high solute concentrations against inactivation of *Rhodotorula rubra*.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 220-223

High hydrostatic pressure (200 to 400 MPa) treatment of *Rhodotorula rubra* suspended in sol. of sucrose, glucose, fructose or NaCl resulted in a_w dependent barotolerance. The protective effect started at values below $a_w = 0.92$ to 0.88. Increase in time of treatment over 15 min had a small influence. In sucrose, the effect was independent of pH between pH 3.0 and 8.0. Inactivation of the yeast at low a_w could be achieved by pressure treatment at increased temp. (45°C). At atmospheric pressure, processing temp. of 70 to 80°C were required to accomplish the same effects. AA

BIOTECHNOLOGY

Nil

TISSUE CULTURE

Nil

FOOD ADDITIVES

251

Smith (RL) and Ford (RA). **GRAS substances: Recent progress in the consideration of flavouring ingredients under the Food Additives Amendment.** *Food Technology* 47(6); 1993; 104, 106, 108, 112, 114, 116, 117

A list of 22 new flavouring ingredient substances determined to be generally recognized as safe (GRAS) by the expert panel of the Flavour and Extract Manufacturers' Association is presented in this article. CSA

Sweeteners

252

Verdi (RJ) and Hood (LL). **Advantages of alternative sweetener blends.** *Food Technology* 47(6); 1993; 94, 96, 98, 100, 101

The advantages that can be expected when formulating foods and beverages with sweetener blends such as aspartame, acesulfame K, saccharin, alitame and sucralose which provides better taste, stability and economics than single sweeteners is discussed. CSA

CEREALS

253

Nuebel (C) and Peleg (M). **Compressive stress-strain relationships of two puffed cereals in bulk.** *Journal of Food Science* 58(6); 1993; 1356-1360, 1374

The compressive stress-strain relationships of two puffed cereals, rice and corn based, in bulk were determined using a Universal Testing Machine. The general sigmoid shape of the relationship could be described by a 4 parameter empirical model originally developed for cellular solids. Jaggedness could be expressed in terms of an apparent fractal dimension and/or the mean magnitude of the power spectrum determined using the Fast Fourier Transform. Both measures as well as a particular parameter of the empirical model were sensitive indicators of the changes in the stress-strain relationships resulting from exposure to different relative humidities. Although the stress strain relationship, especially of dry samples, had an irregular, irreproducible shape, the magnitude of the two roughness measures was highly reproducible. AA

254

Richter (KS), Dorneanu (E), Eskridge (KM) and Rao (CS). **Microbiological quality of flours.** *Cereal Foods World* 38(5); 1993; 367-369

Over 4,000 wheat flour samples were tested according to FDA/BAM methods for *Salmonella* and *Escherichia coli* in addition to yeast and mold, aerobic plate count (APC), and coliform most probable number (MPN) counts. The data were analyzed statistically based on flour type - hard red winter (HRW), soft red winter (SRW), spring (SPG), or durum (DUR) - and season of milling production. SRW had the highest mold count (\log_{10} 3.06 cfu/g) and DUR the lowest (\log_{10} 2.85 cfu/g). SPG had the highest yeast count (\log_{10} 2.27 cfu/g) and SRW the lowest (\log_{10} 2.07 cfu/g). Highest APCs were found in DUR (\log_{10} 4.24 cfu/g), whereas the lowest were in SRW (\log_{10} 3.83 cfu/g). Of the samples tested, 12.8% were *E. coli* positive and 1.3% were *Salmonella* positive with the highest frequency of each pathogen occurring in the fall and winter months, respectively. The lowest *E. coli* frequency occurred during spring, whereas *Salmonella* had the lowest incidence in summer. The highest % of *E. coli* positives was observed in DUR (17%) and the lowest was observed in HRW samples (6.7%). The highest % of *Salmonella* positives existed in SRW (2.3%) and the lowest in DUR flour samples (0.3%). From the data, 95% confidence limits of 5,700 cfu/g for mold, 110,000 cfu/g for APC, and 150 MPN/g for coliforms were determined for all wheat flours. AA

255

Madhyastha (S), Marquardt (RR) and Abramson (D). **Effect of ochratoxin producing fungi on the chemical composition of wheat and barley.** *Journal of Food Quality* 16(4); 1993; 287-299

Autoclaved barley and wheat were inoculated with *Aspergillus alutaceus* (formerly called *A. ochraceus* Wilhelm NRRL-3174) and *Penicillium verrucosum* Dierckx and incubated at 28°C for 7, 15 and 30 days. Ochratoxin production of *P. verrucosum* on both barley (56 µg/g) and wheat (109 µg/g) increased significantly after 30 days of incubation. Ochratoxin production was significantly higher for *A. alutaceus* on wheat (79 µg/g) compared to barley (38 µg/g). Wheat supported the growth of both fungi significantly better than barley. There were marked decrease in the lipids in wheat and barley; modest decrease in their starch content; enhanced concn. of protein in wheat with both the fungal species; and a change in the relative

concn. of some of the amino acids in wheat. These indicate that under certain conditions large amounts of Ochratoxin can be produced in grains with correspondingly small effects on starch and protein contents. SD

Barleys

256

Bason (ML), Ronalds (JA) and Wrigley (CW). **Prediction of safe storage life for sound and weather-damaged malting barley.** *Cereal Foods World* 38(5); 1993; 361-363

Measures of damage index employed in this study include falling number, stirring number, Ceralpha α -amylase and a newly derived hot water immersion test. All of these were well correlated with grain storage life for 7 cvs of malting barley stored at 3 different temp. (30, 47 and 60°C). Consequently they have been fitted to the storage life model which is available as a software package (SAFESTOR) for use by the industry. It permits prediction of acceptable storage life, and thus provides a tool for the better management of barley storage. CSA

Oat

257

Liukkonen (K), Kaukovirta-Norja and Laakso (S). **Elimination of lipid hydrolysis in aqueous suspensions of oat flour.** *Journal of Cereal Science* 17(3); 1993; 255-265

Aqueous suspensions of oat flour were studied to investigate the possibilities of eliminating the development of rancidity due to lipid hydrolysis. The hydrolysis was efficiently eliminated by immersing dry-milled flour in slightly alkaline water. Only a slight increase in pH was needed (pH 8-9) at the beginning of the soaking to prevent almost completely the hydrolysis of triglycerides, which under similar conditions, but in water without pH adjustment, led to free fatty acid content of upto 36% of the total lipids. In the alkaline suspensions the selective loss of linoleic acid from polar lipids, observed in a water slurry, was also very efficiently reduced. The hydrolysis of triglycerides was also diminished at acidic pH values (below pH 6) increasingly

with reducing pH, although the same efficiency of inhibition as at alkaline pH was not reached. It was concluded that wet processes can be used for the preparation of non-deteriorated oat products by including simple pH adjustments in the process. AA

258

Ekstrand (B), Gangby (I), Akesson (G), Stollman (U), Lingnert (H), Dahl (S). **Lipase activity and development of rancidity in oats and oat products related to heat treatment during processing.** *Journal of Cereal Science* 17(3); 1993; 247-254

A pilot plant process simulation of dry and wet hydrothermic treatment of oats was performed in order to study the effect of the different process steps on lipase activity and the storage stability of the fat phase. A comparison was made between oats that had passed through a dry kiln treatment prior to steam preparation and oats that had only been steam-treated. Samples were taken after each step in the process as well as during storage at +30°C for up to 44 wks. The lipase activity disappeared after steam preparation, but not after the dry-heat treatment used in this process experiment. The fat phase was analysed with regard to the amount of free fatty acids (FFA) and the content of individual fatty acids. The initial content of FFA was about 8-9%. The hydrolysis of fat, giving an increase in the amount of FFA, took place in all the stored samples, but was much more pronounced in the samples that had not undergone dry-heat treatment. In the dry-heat-treated samples, the FFA concn. reached a max. at 13-15% after 16 wks of storage. In the samples that had not been dry-heat-treated, the FFA reached over 30% in whole oat grains after 16 wks of storage and continued to increase to over 40% after 30 wks of storage. In the flour the FFA concn. was lower than in whole grains. Unexpectedly, lipolysis in this case was more pronounced in the whole kernels than in the flour samples. Lipolysis was not related to the measured remaining lipase activity. Head-space analyses of hexenal indicated that the formation of volatile lipid oxidation products was dependent on the process design, but the hexenal concn. was not related to the amount of FFA. AA

Rice

259

Morita (T) and Kiriya (S). **Mass production method for rice protein isolate and nutritional evaluation.** *Journal of Food Science* 58(6); 1993; 1393-1396, 1406

A method for mass production of highly purified rice protein isolate (RPI) was developed and its chemical composition was analyzed. The nutritional quality of RPI and its effect on lipid metabolism in rat was also examined. Rice flour was mixed with a 0.6% Termamyl 120L-sol. (1:2, w/v) at room temp. (= 23°C), to obtain thick slurry. The slurry was heated at 97°C for 2 h with stirring. Gelatinization and liquefaction occurred simultaneously RPI obtained by filtration and washing with boiling water was more than 90% pure protein (dry matter basis), had 6.4% dietary fiber, 1.3% ash and 1.1% carbohydrate. RPI diets (40-50%) allowed the max. growth in rats comparable to that with 25% casein diet. GS

260

Lin (SH). **Water uptake and gelatinization of white rice.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 276-278

A mathematical model is employed to describe the water diffusion and gelatinization of white rice. Experiments are performed to measure change of water content of rice during soaking. The observed data are used to estimate the effective diffusion and reaction rate coefficients. Both temp.-dependent coefficients are shown to obey the Arrhenius equation with a distinct break point where rapid gelatinization of rice begins. The enhanced gelatinization process is seen to cause a considerable increase in the activation energies. AA

261

Lima (I) and Singh (RP). **Objective measurement of retrogradation in cooked rice during storage.** *Journal of Food Quality* 16(5); 1993; 321-337

An Instron Universal testing machine and Differential Scanning Calorimetry were used to

investigate textural changes in cooked rice during storage. Two cells were used with the Instron for hardness measurement (Ottawa Texture Measuring System and Back Extrusion cells) and one cell for adhesion measurement (adhesion cell). During storage of cooked rice, retrogradation of the starch led to an increase in hardness as well as a decrease in the adhesion of cooked rice. Storage time, temp. and var. significantly influenced the hardness and adhesion of cooked rice. A correlation analysis between methods showed that Instron measurements OTMS and BE correlated better with a correlation coefficient of 0.978 than the two Instron methods and DSC with a correlation coefficient of 0.752. AA

262

Satyanarayana (A), Giridhar (N), Venkateswara Rao (M) and Krishna Murthy (GV). **Physical, chemical and milling characters of rice varieties.** *Andhra Agricultural Journal* 38(2/3); 1991; 133-138

25 rice var. for physical and milling characteristics and of them 15 var. for their chemical composition of rice grain and bran were studied. The highest yield of brown rice was in Rajendra (80.4%) and the highest yield of head rice in Vasishta (70.2%). The total amylose content was higher in Dhanyalaxmi and IR 50 (28.63%). The water insoluble amylose content of the starch showed an inverse relation with the gelatinization temp. The highest bran content was in Dhanyalaxmi (8.3%) and the bran oil content in NLR 13969 (25.0%). The var. indicated marked variability for the quality characters. AA

Wheat

263

Shashikumar (K), Hazelton (JL), Ryu (GH) and Walker (CE). **Predicting wheat sprout damage by near-infrared reflectance analysis.** *Cereal Foods World* 38(5); 1993; 364-366

Naturally weathered and lab.-sprouted wheat samples were used to study the correlations of near-infrared reflectance (NIR) spectra with Rapid Visco-Analyser (RVA) and falling number results. Correlations of $r = 0.95$ and above were observed between values obtained by RVA and

falling number methods. NIR predictions of sprout damage as measured by both falling number and RVA were fair to good ($r = 0.75 - 0.87$). NIR analysis of sprout-damaged wheat meal offers a rapid screening test that would need to be confirmed by RVA or falling number methods in the case of questionable samples. AA

264

Sabbarwal (DB). **Viability of export of wheat.** *Indian Miller* 24(2); 1993; 57-59

Wheat production world wide, domestic, level of consumption, export potential of wheat and wheat flour are discussed. SRA

265

Sorvaniemi (J), Kinnunen (A), Tsados (A) and Malkki (Y). **Using partial least squares regression and multiplicative scatter correction for FT-NIR data evaluation of wheat flours.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 251-258

Scanning Fourier transform near infrared reflectance (FT-NIR) spectroscopy was used to record spectra of roller and commercial milled wheat flours (var. and mixtures). Partial least squares (PLS) regression of multiplicative scatter corrected (MSC) NIR data was carried out. Correlations to moisture, protein, wet gluten, water absorption and falling number were studied. Promising correlations to these parameters except falling number were obtained for both types of milled samples. Explanation factors (R^2) and standard errors of prediction (SEP) in the roller milled flours were as follows: moisture $R^2 = 0.97$ and SEP = 0.16 g/100 g; protein $R^2 = 0.92$ and SEP = 0.40 g/100 g d.b. (dry basis); wet gluten $R^2 = 0.89$ and SEP = 1.37 g/100 g; and water absorption $R^2 = 0.83$ and SEP = 0.84 g/100 g. The explanation factor of predicted falling numbers to the actual values of the roller milled flours remained lower than 0.5. Explanation factors and SEP in the commercial milled flours were as follows: moisture $R^2 = 0.85$ and SEP = 0.19 g/100 g; protein $R^2 = 0.91$ and SEP = 0.63 g/100 g d.b.; wet gluten $R^2 = 0.87$ and SEP = 2.22 g/100 g; water absorption $R^2 = 0.88$ and SEP = 1.10 g/100 g; and falling number $R^2 = 0.55$ and SEP = 28.2. AA

MILLETS

266

Sievert (D) and Wursch (P). **Amylose chain association based on differential scanning calorimetry.** *Journal of Food Science* 58(6); 1993; 1332-1334, 1345

Amylose and lipid depleted starches from amylomaize, pea, maize, wheat, potato and waxy maize were heated from 20°C to 180°C, cooled to 4°C, and then reheated to 180°C in a differential scanning calorimeter (DSC) in excess water. Cooling curves of the amylose and starch melts showed exothermic transitions ($< 70^\circ\text{C}$) attributed to the mechanism of amylose chain association. Amylose/amylopectin mixtures covering the range 0-95% amylose were similarly heated and cooled. The association of linear amylose chains was restricted by amylopectin. AA

Corn

267

Hounhouigan (DJ), Nout (MJR), Nago (CM), Houben (JH) and Rombouts (FM). **Changes in the physico-chemical properties of maize during natural fermentation of mawe.** *Journal of Cereal Science* 17(3); 1993; 291-300

The physical and chemical changes that occurred during a 72 h fermentation period were studied in two differently processed maize doughs from Benin, referred to as home-produced and commercial mawe. The pH decreased from 6.1 to 3.5 in the commercial process and from 6.2 to 3.6 in the home-style process, whereas the titratable acidity increased from 0.2 to 1.7% (w/w, lactic acid) and from 0.3 to 2.3%, respectively. Home-produced mawe had significantly higher levels of crude fat, crude fibre and ash compared with the commercial mawe, as a consequence of the difference in the processing methods. No marked changes in proximate composition occurred during subsequent fermentation. Commercial mawe was whiter than home-produced mawe, and this whiteness increased with increasing fermentation time. Fermentation significantly

increased the swelling and thickening capabilities of mawe, which were more pronounced in the commercial than in home-produced samples. Overall, the commercial mawe process appeared to be a technologically more advanced and effective method of mawe manufacture than the home process. AA

268

Mestres (C), Colonna (P), Alexandre (MC) and Mateucio (F). **Comparison of various processes for making maize pasta.** *Journal of Cereal Science* 17(3); 1993; 277-290

Maize pasta was produced using various heat treatments such as drum-drying, extrusion-cooking, pasting and steaming. Cooking quality of pasta products were compared and discussed on the basis of starch physico-chemical properties. The best products were obtained by using drum-drying or pasting, whereas the worst product was obtained using extrusion-cooked maize starch. This was interpreted in terms of starchy component degradation and amylose retrogradation ability. The treatment of fresh pasta at high temp. (95°C) with high RH (95%) improved pasta quality: after 1 h under these conditions, cooking losses were decreased by 9%. Addition of monoglycerides also significantly improved pasta cooking quality by making complexes with amylose during pasta cooking. In contrast, cold storage promoted amylopectin retrogradation and scarcely improved maize pasta quality. AA

269

Saulnier (I), Mestres (C), Doublier (J-L), Roger (P) and Thibault (J-F). **Studies of polysaccharides solubilized during alkaline cooking of maize kernels.** *Journal of Cereal Science* 17(3); 1993; 267-276

Polysaccharides solubilized during alkaline cooking of maize kernels are acidic heteroxylans. They contain mainly xylose (60%), arabinose (34.4%) and galactose (5.6%) as neutral sugars, but also contain glucuronic acid. Ion exchange chromatography showed major acidic (90%) and minor neutral (10%) components. High-performance size-exclusion chromatography with multi-angle laser-light

scattering detection exhibited some heterogeneity in mol. wt. distribution, and a weight average mol. wt. of 230k was measured with a polydispersity index of 1.6. These polysaccharides had a polyelectrolyte character, and their intrinsic viscosity ($[\eta]$) determined in 0.1 M NaCl was 141 ml/g. They exhibited the flow behaviour typical of macromolecular sol. with a coil overlap concn (C^*) for $C^*[\eta] = 1.2$. Methylation analysis revealed a highly branched structure, in which only approx. 17% of 4-linked xylose residues are not substituted at O-3 or O-2 and O-3. ^{13}C Nuclear magnetic resonance confirmed these structural features. AA

PULSES

270

Weaver (CM), Heaney (WR), Proulx (WR), Hinders (SM) and Packard (PT). **Absorbability of calcium from common beans.** *Journal of Food Science* 58(6); 1993; 1401-1403

Absorption of Ca from white, red and pinto beans, labeled with ^{45}Ca , was measured in 24 women in a three-way randomized design using a Ca load of 72 mg and milk as the referent. Fractional absorption for the 3 beans averaged 0.219 plus or minus 0.047 and did not differ by type. Milk Ca absorption at the same load was more than two times higher, 0.451 plus or minus 0.088 ($P < 0.001$). Oxalate content averaged 0.34%, and phytate averaged 1.7%, a stoichiometric excess relative to Ca. To evaluate the relation of phytate to reduced absorbability, labeled pinto beans were pre-treated with phytase and fed to 10 subjects. Fractional absorption rose, averaging 0.318 plus or minus 0.071, ($P < 0.01$ vs. untreated beans), but was significantly below that of milk. The difference was partly accounted for by phytate, with the remainder probably due to relatively high oxalate. AA

Dry beans

271

Mafuleka (MM), Ott (DB), Hosfield (GL) and Uebersax (MA). **The role of phytase and lignin in decorticated dry bean (*Phaseolus vulgaris*) hardening during storage.** *Journal*

The lignification-like mechanism and that involving phytic acid degradation by phytase were evaluated in the hard-to-cook phenomenon of decorticated Malawian white and red bean genotypes (*Phaseolus vulgaris*). Samples were stored under various temp. (16°C; 35°C) a_w : (0.55 a_w ; 0.85 a_w) and time periods (4 and 8 months) compared to the control group (2°C; 0.30 a_w ; zero months). Phytase activities (Pi), phytic acid, Ca and Mg ions, water soluble pectic substances and lignin concn. were determined spectrophotometrically. Elevated phytase activities and slight, but nonsignificant increase in lignin levels were produced in both bean genotypes maintained under adverse storage conditions for extended time periods. Positive correlations between phytase activities and cooked white bean hardness for the 4 month ($r^2 = 0.844$) (p less than or equal to 0.01) and 8 month ($r^2 = 0.689$) storage periods were found. Lignin content of red beans was significantly (p less than or equal to 0.01) correlated ($r^2 = 0.669$) with hardness for the extended (8 month) storage period. However, no clear relationships were found between lignin levels and the 4 month stored red ($r^2 = 0.232$) and white ($r^2 = 0.210$) bean hardness, and between lignin concn. and the 8 month ($r^2 = 0.232$) stored white bean hardness. The mechanism involving phytic acid degradation appeared to be the dominant system influencing the hard-to-cook defect in the white, and to some extent the red bean genotypes for the storage period 0-8 months. AA

Kidney beans

272

Ho (MF) and Whitaker (JR). **Subunit structures and essential amino acid residues of white kidney bean (*Phaseolus vulgaris*) α -amylase inhibitors.** *Journal of Food Biochemistry* 17(1); 1993; 35-52

Both white kidney bean α -amylase inhibitors WKB 858A (MW 42,000) and WKB 858B (MW 20,000) were composed of two subunits as determined by N-terminal amino acid analysis, by amino acid sequence, by SDS-PAGE and by

separation on a chromatofocusing column in 8 M urea. N-Terminal amino acids for inhibitor WKB 8585A were alanine and glycine, with a sequence of H₂N-Ala- Glu-Asn- Ala-Gly-Thr -Tyr---COOH for deglycosylated 19,000 MW peptide and H₂-Gly-Asn---COOH for deglycosylated 12,000 MW peptide. N-Terminal amino acids for Inhibitor WKB 858B were alanine and serine, with a sequence of H₂N-Ala-Thr-Glu-Thr-Ser---COOH for the deglycosylated 9,000 MW peptide and H₂N-Ser-Ala-Val-Gly-Leu-Asp- Phe- Val-Leu-Val-Pro-Val-Gln- Pro-Glu- Ser- Lys-Gly-Asp-Thr- Val-Thr-Val -Glu- Phe- Asp---COOH for the deglycosylated 15,000 MW peptide. Chemical modification of 2 of 7 His residues with diethylpyrocarbonate resulted in 26% loss of inhibitory activity. Modification of 1.5 of 7 Trp residues with N-bromosuccinimide gave 60% loss of inhibitory activity. Modification of 2 of 6 Tyr residues with N-acetylimidazole gave 60% loss of inhibitory activity. Modification of 3.6 of 6 Arg residues with p-hydroxy phenylglyoxal gave 64% loss of inhibitor activity. These results indicate the possible importance of one or more His, Trp, Tyr and perhaps Arg residues for inhibitory activity against porcine pancreatic α -amylase. AA

273

Ho (MF) and Whitaker (JR). **Purification and partial characterization of white kidney bean (*Phaseolus vulgaris*) α -amylase inhibitors from two experimental cultivars.** *Journal of Food Biochemistry* 17(1); 1993; 15-33

α -Amylase inhibitors WKB 858A and WKB 858B were purified to homogeneity from different cvs of white kidney beans by extraction from the ground beans and by sequential heat treatment, ethanol fractionation, DEAE- cellulose chromatography, Sephadex G-75 gel chromatography and CM- cellulose chromatography. The inhibitors were homogeneous by 7.5% polyacrylamide gel electrophoresis; no iso-inhibitors were found. Inhibitors WKB 858A and WKB 858B had isoelectric points of 5.0 and 4.65, respectively, and mol. wt. of 42,000 and 20,000, respectively, by FPLC Superose 12 gel filtration chromatography. Inhibitor WKB 858A had

mol. wts of 40,000 and 38,000 by Sephadex G-75 gel filtration chromatography and by native gel electrophoresis, respectively. Inhibitor WKB 858A contained 11.0% carbohydrate, N-linked to asparagine residues, with a composition of 1 fucose, 1 xylose, 4 galactose, 8 N-acetylglycosamine and 13 mannose residues per mol. of inhibitor. Amino acid analysis of Inhibitor WKB 858A gave a high content of Asx, Glx, Ser, Thr and Val (combined total of 60%) molar ratio and low content of sulphur amino acid (0.8% molar ratio of Met and no 1/2 cystine). No SH-groups were found. The amino acid composition was similar to that of 8 other α -amylase inhibitors from beans. Inhibitor WKB 858A formed a 1:1 stoichiometric complex with porcine pancreatic α -amylase with a K_i of 1.0×10^{-11} M at pH 5.4 and 30°C; it had no trypsin inhibitory activity. At pH 6.90 and 30°C, the rate of complex formation between Inhibitor WKB 858A and porcine pancreatic- α -amylase was 2.76 times faster at 1.385 vs 0.035 ionic strength (with Na_2SO_4), indicating hydrophobic bonds are most important in complex formation. AA

Pinto bean

274

Czarnecki (Z), Gujska (E) and Khan (K). **Enzyme - pretreatment of pinto bean high protein fraction and time of blending corn meal affects extrudate properties.** *Journal of Food Science* 58(6); 1993; 1404-1406

High protein fraction of pinto bean, treated with papain and cellulase enzymes (Solvay Enzymes Inc.), was blended with corn meal (30%) and extruded at 120°C. Changes in expansion, texture, colour, pH, *in vitro* protein digestibility, reducing sugars and functional properties of extrudates were recorded. Changes depended on type of enzymes and time of corn incorporation (before or after enzymatic pretreatment). The best texture of the extrudates was obtained using a cellulase enzyme. Papain affected some functional properties such as NSI and WSI. The best improvement in *in vitro* protein digestibility and reducing sugars was found with a cellulase treatment. Protein and fiber could be modified to improve physicochemical and functional properties of extrudates. AA

Vanilla beans

275

Adedeji (J), Hartman (TG) and Chi-Tang (H). **Flavour characterization of different varieties of vanilla beans.** *Perfumer and Flavourist* 18(2); 1993; 25-32

The aroma characterization of vanilla beans from different geographical location with a view to developing a database of information to be used as an indication of geographical origin and bean quality are described. Bourbon-A, Tahitian, Bali-A, Java, Bourbon-B, Bali-B, Mexican, Tonga, Costa Rican, Jamaican are the var. studied. Flavour and aroma in these var. is made up of wide var. of organic compounds, mostly aldehydes, ketones, acid, alcohols, esters, ethers, long-and-short-chain hydrocarbons, oils, waxes and resins. SRA

OILSEEDS AND NUTS

Groundnuts

276

Prinyawiwatukul (W), Beuchat (LR) and McWatters (KH). **Functional property changes in partially defatted peanut flour caused by fungal fermentation and heat treatment.** *Journal of Food Science* 58(6); 1993; 1318-1323

Changes in functional properties of flour made from partially defatted peanut fermented with *Rhizopus microsporus* var. *oligosporus* and treated with steam were investigated. An ester-like aroma was detected in fresh fermented peanut and soy sauce or meat-like flavours were detected in dried fermented peanut. Nitrogen solubility (pH 4.0-6.0), emulsion capacity and viscosity, water adsorption, and water and oil retention of flours were slightly increased as a result of fermentation. Steam treatment of non-fermented and fermented peanut flours for up to 45 min enhanced some functional properties. AA

Muego-Gnanasekharan (KF) and Resurreccion (AVA). **Physicochemical and sensory characteristics of peanut paste as affected by processing conditions.** *Journal of Food Processing Preservation* 17(5); 1993; 321-336

The effects of temp. and number of water extractions on lipoxygenase colour, instrumental textural properties, hexanal in headspace volatiles, and sensory characteristics of peanut paste were determined. Water extraction at 90°C for 10 min at least three times produced a more spreadable paste with less volatile hexenal and raw beany flavour than pastes subjected to the different treatments studied. RN

Soybeans

278

Kermasha (S), Bisakowski (B), Ramaswamy (H) and Van de Voort (FR). **Thermal and microwave inactivation of soybean lipoxygenase.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 215-219

The inactivation of commercial soybean lipoxygenase was studied at various temp. using conventional and microwave heating. Conventional heating was carried out in a temp. controlled water-bath, while a custom designed microwave temp. control system was used to maintain test samples at selected temp. either by full exposure to microwaves (microwave heating) or partial exposure by immersion in water (in a beaker) maintained at the desired temp. using the microwave oven (mixed mode). Lipoxygenase inactivation was evaluated using first-order reaction kinetics. Conventional and mixed mode heating produced somewhat similar results while the microwave mode resulted in a more rapid inactivation of the enzyme. The activation energies (E_a) were 119, 113 and 180 kJ/mol, respectively, for the conventional, mixed and microwave mode heating. Higher enzyme inactivation rates under microwave heating conditions were ascribed to possible non-thermal effects. AA

Soy proteins

279

Myers (DJ). **Industrial application for soy protein and potential for increased utilization.** *Cereal Foods World* 38(5); 1993; 355-360

Aspects outlined in this article are the production of soy products and commercial soy protein products, utilization of soy proteins in industries, its applications in adhesives, paper coating, plastics, textiles, the potential and barriers for the increased utilization of soy products and the future growth of soy protein markets. CSA

TUBERS AND VEGETABLES

Root vegetables

Carrots

280

Tatsumi (Y), Watada (AE) and Ling (PP). **Sodium chloride treatment or waterjet slicing effects on white tissue development of carrot sticks.** *Journal of Food Science* 58(6); 1993; 1390-1392

Treatment of carrots with NaCl sol. or slicing with a high pressure water jet stream was evaluated for reducing the amount of white tissue development or carrot stick surfaces. A 0.5 or 1.0M sol. treatment resulted in less white tissue than treatment with lower concn. of NaCl. However, the NaCl treatment caused a wt. loss of 4-10% (not commercially acceptable). Water jet slicing resulted in striation of surface tissue and left loose layers of cells, as observed with the scanning electron microscope. These cells dehydrated rapidly and formed as much white tissue as on carrots sliced with a culinary knife. AA

Cassava

Garl

281

Akingbala (JO), Oguntimein (GB) and Bolade (MK). **Effect of unit operations of production**

on the cyanide content and the acceptability of garl. *Journal of Food Processing Preservation* 17(5); 1993; 337-350

The effect of holding, pressing, initial moisture content, sun heating, and garlifying, on pH, total titrable acidity (TTA) and residual cyanide content of cassava mash, cake and garl were evaluated. A new method to make garl with very low residual cyanide was developed. Increasing holding time decreased pH, cyanide content, but increased (TTA) of mash and garl when initial moisture content of mash was greater than or equal to 63-65%. The optimum holding time was 72 h. Sensory properties of garl prepared by the new lab. method were similar to those of garl produced by traditional method. RN

Tubers

Potatoes

282

Eshtlaghi (MN) and Knorr (D). **Potato cubes response to water blanching and high hydrostatic pressure.** *Journal of Food Science* 58(6); 1993; 1371-1374

High hydrostatic pressure treatment (400 MPa, 15 min, 5-50°C) of potato cubes (2 x 2 x 2 cm) was compared with hot water blanching (100°C, 30-180 sec). Inactivation of microorganisms and polyphenoloxidase, texture and density change, leaching of potassium and loss of ascorbic acid were monitored. Reduction of microbial counts was comparable for both methods and polyphenoloxidase was completely inactivated at 20°C, when dilute citric acid sol. (0.5 or 1.0%) were used as "immersion" medium. Hot water blanching and high pressure treatment resulted in samples of similar softness. Leaching of potassium was reduced 20% after pressure treatment on vacuum-packaged samples. Retention of ascorbic acid in pressure-treated samples was temp. dependent ranging from approx. 90% at 5°C to approx. 35% at 50°C. AA

283

Mondy (NI), Subash Chandra and Munshi (CB). **Zinc fertilization increases ascorbic acid and**

mineral contents of potatoes. *Journal of Food Science* 58(6); 1993; 1375-1377

The effects of Zn fertilization on ascorbic acid and mineral concn. of Katahdin potatoes were investigated over 2 yr. During the first yr ZnSO₄ was banded during planting at rates from 11.2 to 224 kg/ha in 2 locations in New York. During the second yr ZnSO₄ was banded during planting at rates of 0, 22.4, 44.8 and 112 hg/ha at one of the locations. Ascorbic acid content of tubers was higher only with the 112 Kg/ha ZnSO₄ treatment. Zn fertilization resulted in higher Zn concn. in tubers during both yrs and at both locations. Zn fertilization increased amounts of Ca, Mn, Cu, Al and Co but did not affect Cd content in potato tubers. AA

284

Munshi (CB), Cary (EE) and Mondy (NI). **The effect of soil entrapment by the periderm on the mineral element composition of potatoes.** *Journal of Food Quality* 16(1); 1993; 45-55

Potato cvs 'Katahdin', 'Norkwig Russet' and 'Shepody' cultivated on uncontaminated soil and titanium as marker element to correct for contamination by soil were used. Soil entrapment significantly increased tuber mineral element concn., especially Ca and Mg concn. and microelements, especially Al (95%), Fe (88%) but Mn less (4%) and Cd, Co, Cu and Zn none. Highest concn. of elements including Al were in the peel and least in the pith. Accumulation of mineral elements in peel (rougher peel with greater soil entrapment) differed between the cvs. Boiling significantly decreased macroelements and increased microelements in the peel. With tubers grown in contaminated soils, peeling before cooking would remove the nutritionally undesirable mineral elements. SD

285

Mondy (NI), Uma Reddy and Munshi (CB). **Effect of packaging material on the quality of potatoes treated with isopropyl N-(3-chlorophenyl) carbamate (CIPC).** *Journal of Food Quality* 16(5); 1993; 393-403

Katahdin and Russet Burbank potatoes, treated with isopropyl N-3(-chlorophenyl) carbamate CIPC and stored for 4 months at 5°C in either mesh or polyethylene bags (2 packaging materials frequently used for potato storage), were tested for enzymatic discoloration, phenolic and ascorbic acid concn. CIPC residues in tubers stored in polyethylene bags were significantly ($p < 0.01$) higher than those stored in mesh bags. Tubers stored in polyethylene showed significantly ($p < 0.05$) higher discoloration and phenolic concn., and lower ascorbic acid concn. than those stored in mesh bags. Differences in CIPC retention of the tubers stored in the two packaging materials may have been responsible for some of the differences in quality factors since CIPC was shown to significantly ($p < 0.01$) increase the enzymatic discoloration and phenolic concn., and decrease the ascorbic acid concn. of both cvs. AA

Yam

286

Nok (AJ), Gimbo (CE), Kagbu (JA) and Ogbadoyi (EO). **Kinetic studies and mechanism of catalysis of malic dehydroxygenase from *Dioscorea rotundata* tuber.** *Journal of Food Biochemistry* 16(6); 1993; 339-347

The kinetic mechanism (k_m) values of catalysis by yam malic dehydrogenase showed an ordered sequential mechanism (SM). The K_m values obtained from secondary plots were 0.05, 0.08, 0.48 and 2.56 mM for NADH, OAA and NAD^+ and L-malic acid respectively. Product inhibition studies in both the forward and backward reactions support an ordered Bi-Bi SM. This begins with an obligatory binding of NAD^+ to form the first binary complex and a final release of NADH. BV

Vegetables

287

Heaney (RP), Weaver (CM), Hinders (SM), Martin (B) and Packard (PT). **Absorbability of calcium from brassica vegetables: Broccoli, bok choy and kale.** *Journal of Food Science* 58(6); 1993; 1378-1380

Absorption of Ca from 3 intrinsically labeled *Brassica* sp. vegetables was measured in 15 normal women in a 3-way randomized design. The test load of Ca was about 83 mg for each source. Fractional Ca absorption from broccoli averaged 0.478 plus or minus 0.089, from bok choy stems, 0.519 plus or minus 0.089, from bok choy leaves, 0.520 plus or minus 0.074, and from kale 0.527 plus or minus 0.091. These differences were both absolutely small and statistically insignificant. Mean absorbability of milk calcium ingested at the same load has been previously shown to be 0.463 plus or minus 0.095. This value is slightly but significantly lower than the av. value for the *Brassica* sources combined (0.514 plus or minus 0.090). Thus, *Brassica* vegetable sources exhibit excellent Ca bioavailability. AA

Bitter gourd

288

Mohammed (M) and Wickham (LD). **Extension of bitter gourd (*Momordica charantia* L.) storage life through the use of reduced temperature and polyethylene wraps.** *Journal of Food Quality* 16(5); 1993;371-382

Bitter gourd fruits were stored individually wrapped in low density polyethylene (LDPE) film or unwrapped for up to 21 days at 5-7°C, 20-22°C and 28-30°C, respectively. Assessment was done on several quality parameters including marketable quality. Storage of film-wrapped fruit at 5-7°C resulted in extension of shelf-life in excess of two wks and delayed appearance of chilling injury symptoms. Additionally, film-wrapped fruits stored at 5-7°C were still marketable after 21 days, had lowest fresh wt. losses, less softening, reduced incidence of postharvest rots and minimal changes in vitamin C content and pH. Storage of individually wrapped fruits at reduced temp. therefore offers an effective method of prolonging the shelf-life of bitter gourd. AA

Cucumbers

289

Guillou (AA) and Floros (JD). **Multiresponse optimization minimizes salt in natural**

cucumber fermentation and storage. *Journal of Food Science* 58(6); 1993; 1381-1389

Response surface methodology was used during natural cucumber fermentation and storage to quantitatively determine effects on NaCl (0-10%), CaCl₂ (0-0.4%) and potassium sorbate (0-0.4%) on brine pH, cucumber texture and microbial (yeast/mold) contamination. Multiresponse optimization methods (conventional and improved graphical methods, extended response surface procedure and desirability function approach) were employed to minimize use of NaCl. Cucumbers fermented and stored in brines containing approx. 3% NaCl, 0.28% CaCl₂ and 0.3% potassium sorbate were predicted to exhibit vigorous fermentation, be free of yeast/mold contamination, and maintain good firmness after 6 months storage. Predicted results were experimentally confirmed. AA

290

Brigance (AR) and Buescher (R). **Effect of ozone on softening enzymes, sorbate, pigment and bacteria in recycled pickle brine.** *Journal of Food Biochemistry* 16(6); 1993; 359-369

Recycled cucumber pickle brine (RCPB) treated with O₃ (176 to 246 µg/ml of recycled brine that was added in 10-14 min) showed inactivation of cellulase (CX) and polygalacturase (PG). Potassium sorbate and bacteria were also destroyed in RCPB and brine colour faded at 400 nm. Utilization of O₃ provides an alternative method for inactivating CX and PG in RCPB; however, the effects of O₃ treated brines on cucumber fermentation and subsequent pickle quality must be evaluated. BV

Leafy vegetables

Lettuce

291

Albrecht (JA). **Ascorbic acid content and retention in lettuce.** *Journal of Food Quality* 16(4); 1993; 311-316

Ascorbic acid content of locally grown lettuce cvs ranged from 9.24 mg ascorbic acid/100 g which is greater than the reported values and for purchased lettuce cvs it ranged from 3.14 mg/100 g. Ascorbic acid retention for lettuce cvs stored for 1 wk ranged from 40-74% for 2 wks stored ones 8-68%. SD

Tomatoes

292

Tucker (GA). **Improvement of tomato fruit quality and processing characteristics by genetic engineering.** *Food Science and Technology Today* 7(2); 1993; 103-108

The potential traits of tomato fruit that could be manipulated by genetic engineering; properties of cell wall polyuronides in normal and genetically engineered fruits; genetic manipulation of pectolytic activity in tomato fruit; enzyme activities in normal and genetically engineered ripe tomato fruit are outlined. GS

FRUITS

293

Lurie (S). **Modified atmosphere storage of peaches and nectarines to reduce storage disorders.** *Journal of Food Quality* 16(1); 1993; 57-65

LDPE film of 40 micron thickness extended the storage life of peaches and nectarines and decreased internal flesh breakdown and reddening while polyolefin film was ineffective. Six fruits per pack generated higher CO₂ (which improved the fruit quality) and lowered O₂ than 2 or 4 fruits per pack. SD

294

Lal (BB), Joshi (VK), Thakur (NS) and Goel (S). **Fruit marketing in plastic containers - a big relief to foresters.** *Packaging India* 26(5); 1994; 11, 13, 14

The use of plastic cartons and crates in apple and plum trade, for packaging, transportation, marketing, storage and the physiology of fruits

in the plastic containers is discussed in this article. CSA

Apples

295

Pizzacaro (F), Torreggiani (D) and Gilardi (G). **Inhibition of apple polyphenoloxidase (PPO) by ascorbic acid, citric acid and sodium chloride.** *Journal of Food Processing Preservation* 17(1); 1993; 21-30

The study conducted with 'Golden Delicious' apple cubes showed that dipping in ascorbic acid (0.2 - 10 g/l range) and in NaCl (0.2 - 1 g/l range) sol. for 5 min increases the PPO activity. Citric acid sol. have little or no inhibition. 90 - 100 PPO inhibition was obtained with a 5 min dip in mixtures of ascorbic acid - citric acid (10 + 2 g/l) and ascorbic acid - sodium chloride (10 + 0.5 g/l). RN

296

Paoletti (F), Moneta (E), Bertone (A) and Sinesio (F). **Mechanical properties and sensory evaluation of selected apple cultivars.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 264-270

Selected commercial apple cvs. (Golden Delicious, Stark Delicious, Renetta, Annurca, Granny Smith, Emperor) were studied to discriminate among the cvs and the different levels of merceological quality for their mechanical and texture characteristics, by instrumental and sensory methods. Single compression, double compression and penetration tests were carried out to determine mechanical and texture properties of the apple flesh (failure stress and strain, modulus of deformability, juiciness, cohesiveness and firmness). Sensory responses were obtained by the descriptive technique of texture profile analysis and by the pairwise ranking test (paired comparisons of more than 2 samples) for the following parameters: fracturability, firmness, cohesiveness, mealiness and juiciness. Annurca and Granny Smith cvs showed the highest values for almost all the instrumental and sensory parameters measured. The instrumental methods indicated that the internal variability of flesh structure influenced the differences among the

cvs, although some significant differences were clear. Results from the correlation study between instrumental and sensorial parameters were affected by the non-homogeneous distribution of the values in the correlation plots, probably due to the low number of samples considered. Principal component analysis applied to the instrumental results showed that the first two components described about 85% of the total variance. The first component was a linear combination of 5 variables, excluding the failure strain, while the second was a failure strain factor. It seems that only two parameters, the failure stress for instance and the failure strain, would be sufficient to point out differences among the cvs and the merceological quality levels considered. AA

Limes

297

Sierra (CC), Molina (EB), Zaldivar (CP), Flores (LP) and Garcia (LPDL). **Effect of harvesting season and postharvest treatments on storage life of Mexican limes.** *Journal of Food Quality* 16(5); 1993; 339-354

Mexican limes were coated with wax applied through spraying or dipping and treated with thiabendazole (TBZ) at 500 p.p.m. and gibberellic acid (GA3) at 250 p.p.m. and stored at 8, 10 and 20°C at 85-90% RH. Wt. loss, % of juice, °brix, titratable acidity, colour development and severity of chilling injury were obtained at weekly intervals. Limes harvested in July during the max. production period retained 90.6% of their fruit marketability compared to those harvested in September. Waxing by dipping + TBZ at 500 p.p.m. + GA3 at 250 p.p.m. and 10°C, 85-90% RH gave the best quality. SD

Nectarines

298

Von Mollendorff (LJ), de Villiers (OT), Jacobs (G) and Westraad (I). **Molecular characteristics of pectic constituents in relation to firmness, extractable juice, and woolliness in nectarines.** *Journal of the American Society for Horticultural Science* 118(1); 1993; 77-80

The differences in the composition and gelling characteristics of extracted pectins in 'Flavortop' nectarines stored for 4 wk at -0.5°C before being ripened at 15°C or being ripened immediately after harvest was studied. As ripening progressed, the extractable juice in both treatments decreased to low values (11 and 17%) after which it increased with further ripening. Wooliness occurred in cold stored nectarines and increased progressively from 13% on the 2nd day of ripening to 85% on the 6th day of ripening. Fruit firmness (FF) decreased by approx. 15.7 N to 82.3 N at the start of ripening during 4 wk of cold storage. FF decreased rapidly during ripening in both treatments and stabilized at approx. 19.6 N as fruit became fully ripe. The soluble pectin concn. in both treatments increased at the expense of insoluble pectin as fruit firmness decreased. The extractable juice was lowest when the viscosity of soluble pectins and % of wooly fruit were highest. During ripening at 15°C the mol mass distribution of soluble pectins decreased considerably. SRA

Peaches

299

Lu (JY), Lukombo (SM), Stevens (C), Khan (VA), Wilson (CL), Pusey (PL), Chaultz (E). **Low dose UV and γ -radiation on storage rot and physicochemical changes in peaches.** *Journal of Food Quality* 16(4); 1993; 301-309

Pears

300

Chen (PM), Varga (DM) and Mielke (EA). **Ripening behaviour of 'Columbia' and 'Gebhard' strains of red 'd'Anjou' pears after cold storage.** *Journal of the American Society for Horticultural Science* 118(1); 1993; 81-85

'Columbia' and 'Gebhard' strains of red 'd'Anjou' pears (*Pyrus communis* L.) harvested at similar maturity exhibited different ripening behaviour after monthly removal from 1°C storage in air. 'Columbia' fruit produced ethylene at higher rates than 'Gebhard' fruit during 15 days of ripening at 20°C after each corresponding storage interval. 'Gebhard' fruit required a longer period of chilling than 'Columbia' fruit to generate noticeable rates of

ethylene during ripening. The unripened fruit of both strains contained similar amounts of ACC at each corresponding storage interval. At each corresponding ripened state, ACC content in 'Columbia' fruit increased 2 to 3-fold, while that in 'Gebhard' fruit changed very little. After sufficient chilling, 'Columbia' fruit increased 2 to 3-fold, while that in 'Gebhard' fruit also softened but to a lesser extent than 'Columbia' fruit. Ripened 'Gebhard' fruit had only slightly lower levels of EJ than unripened fruit and did not develop a buttery and juicy texture after any storage intervals. Titratable acidity (TA) in fruit of both strains varied between for the 1988 and 1989 seasons but decreased significantly during storage in both years. Soluble solids concn. (SSC) in both strains also varied seasonally but did not change during storage or ripening. AA

Persimmon

301

Ben-Arie (R) and Sonogo (L). **Temperature affects astringency removal and recurrence in Persimmon.** *Journal of Food Science* 58(6); 1993; 1397-1400

Astringency was removed from 'Triumph' persimmons by immersion in water at 40°C for 5 h or 60°C , for 1 h. Similar treatments at 20°C and 80°C , had no effect on astringency reduction. Subsequent application of 80% CO_2 for 48 h was effective for 20°C -treated fruit but not for 80°C -treated fruit, which became nonastringent only after exposure to acetaldehyde. Extending the 60°C treatment beyond 2 h resulted in recurrence of astringency, which was not reduced by subsequent CO_2 treatment. Astringency also recurred in CO_2 -treated non-astringent fruit, when exposed to high temp. The disappearance and recurrence of astringency correlated with amount of methanol-soluble tannins. AA

Pineapple

302

Fontana (AJ), Howard (L), Criddle (RS), Hansen (LD) and Wilhelmsen (E). **Kinetics of deterioration of pineapple concentrate.** *Journal of Food Science* 58(6); 1993; 1411-1417

Pineapple juice conc. undergoes reactions leading to colour formation and quality loss. Kinetics were studied calorimetrically, spectrally and by chemical analysis. Two exothermic processes occurred between 40 and 80°C, one independent of, and one dependent on O₂ concn. The rate of the O₂ independent reaction decreased exponentially with time, (sucrose hydrolysis). The rate of the O₂ dependent process was constant with time, complex, and not defined. Heat producing reaction rates were not altered by concn. of major sugars/organic acids. Development of colour occurred later than heat production. Colour development had a complex dependence on solids and O₂ concn., and correlated with initial rate of 5-hydroxy-methylfurfural (HMF) formation. CO₂, decrease in titratable amines and amino acids, and loss of reducing agents accompanied colour development. Heat and colour production and chemical changes correlated with sensory quality. AA

CONFECTIONERY, STARCH AND SUGAR

303

Brake (NC) and Fennema (OR). **Edible coatings to inhibit lipid migration in a confectionery product.** *Journal of Food Science* 58(6); 1993; 1422-1425

Coatings containing hydrocolloids and sweeteners were tested for lipid barrier and sensory properties, adhesion to chocolate, viscosity, and *a_w*. A coating containing high methoxyl pectin, acacia gum, high fructose corn syrup, dextrose, fructose, and sucrose was most effective. Coatings (0.5 mm thick, *a_w* 0.5) showed no detectable oil migration after 47 days at 30 plus or minus 1°C, compared to 11.5 mg/cm² trilinolein equivalents migration in 1 day at 21 plus or minus 2°C. Coatings (0.5 mm thick) were applied between chocolate and peanut butter and tested for sensory characteristics. Except for the colour of the coating, no significant difference occurred in overall preference compared to control (no coating) samples. AA

304

Sreenath (HK). **Hydrolysis of carboxymethyl celluloses by cellulases.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 224-228

Water soluble carboxymethyl celluloses (CMCs) were hydrolysed using food grade commercial cellulases. The CMC hydrolysates obtained had low viscosity and contained mainly celloligomers along with low amounts of cellobiose and glucose. A viscosity reduction of 98 to 99% was achieved after 5 min of cellulolytic hydrolysis of CMCs. On the other hand, acid hydrolysis of CMC was slow and took 1 h to reach a viscosity reduction of 93% and the hydrolysate contained high amounts of glucose in the reaction mixture. Cellulase from *Trichoderma viridae* produced 2 to 4 times more glucose in the CMC hydrolysate compared to cellulase from *Aspergillus niger*. Thus, the latter contained probably higher endo- and lower exo-β-(1-4)-glucanase activity than the former. The amount of glucose in the reaction mixture was further monitored by optimizing various factors influencing the cellulolytic hydrolysis of CMCs, such as pH, temp., time of reaction, substrate and enzyme concn. and type of CMC itself. AA

305

Raja (KCM) and Ashok Pandey. **Recent trends in carbohydrate research. Proceedings of the 8th carbohydrate conference. 18th - 20th November 1992, Trivandrum, India.** 1-275; 1992

The proceedings on recent trends in carbohydrate research covers titles such as chitin, chitosan and their derivatives, production and applications by Ramachandran Nair, K. G.; and Madhavan, P (pp. 59-65); status of cassava starch research a national scenario by Raja, K. C. M. (pp 74-79); scope and development of guar gum industry in India by Mathur, N. K. and Mathur, V. (pp 80-82). The chemical basis of differences in eating quality of rice by Bhattacharya, K. R. (pp 112); carbohydrates and Ayurveda by Warriar, N. V. K.; distribution of anhydroglucose chains in rice amylopectin and its relation to rice quality by Radhakrishna Reddy, K. et al (pp 149-158); polyols from sugars by Gehlawat, J. K. (pp 159-164); influence of some physiologically active organic compounds on lactic acid and

alcoholic fermentation by Singh, S. P. et al (pp 173-175); maltose rich syrups: new sweeteners for Indian market by Thacker, S. P. et al (pp 223-225); studies on the production of maltodextrin syrup from cassava starch using microwave energy by Abraham, T. E. (pp 226-230); an improved method of production of high quality agar from Indian sea weeds by Mathew, P. T. et al (pp 231-234); effect of domestic processing (roasting and malting) on carbohydrate content, starch digestibility (*in vitro*) and viscosity of ready-to-eat home made supplementary foods by Saroj Dahiya and Kapoor, A. C. (pp 235-241); utilization of microbial and polysaccharides in milk based products by Sushma Thakur and Prasad, M. S. (pp 242-245); studies on breadmaking from sprouted wheat by payannavar, C. S. et al (pp 248-252); behaviour of some gums towards interaction with wheat starch: effect of germination by Poonam Sethi et al (pp 253-256) and bead form of guaran gel for chromatographic column packing by Subodh Kumar et al (pp 257-259). CSA

BAKERY PRODUCTS

306

Collar (C) and Martinez (CS). **Amino acid profiles of fermenting wheat sour doughs.** *Journal of Food Science* 58(6); 1993; 1324-1328

Unfermented wheat sour dough (USD) and fermented wheat sour doughs (FSD) started with *Lactobacillus plantarum* were analysed for their free amino acid profiles. Individual and total free amino acid levels of USD and FSD were closely dependent on processing conditions, particularly for FSD samples. A wide range of values in total amino acid content (mg/100 sour dough d.b) was obtained with USD (40.30 mg to 119.24 mg) and FSD (22.40 mg to 230 mg) samples. Predominant groups of amino acids included dicarboxylic acids and amides -18.44 to 51.49 mg (USD), 4.93 mg to 37.33 (FSD) - and aliphatic amino acids -7.17 to 22.01 mg (USD), 5.13 to 94.04 mg (FSD), while hydroxyl (< 9.43 mg) and sulphur containing (< 8.61 mg) amino acids constituted minor components. Aromatic (up to 40.63 mg) and basic (upto 83.02 mg) components were prominent in FSD. GS

307

Goedeken (DL) and Tong (CH). **Permeability measurements of porous food materials.** *Journal of Food Science* 58(6); 1993; 1329-1331

A technique to determine the permeability of porous food materials and to establish the relationship between permeability and porosity, fat content and moisture content for a pre-gelatinized dough sample was developed. Porosity was the only parameter which directly influenced permeability which ranged from 0.02 darcies at 0.10 porosity to 23 darcies at 0.060 porosity. The relationship between permeability and porosity for dough was different than that for granular particles. Permeability was not directly affected by moisture content < 50% and fat content to 6%. GS

308

Kieffer (R), Belitz (H-D), Zweier (M), Ipfelkofer (R) and Fischbeck (G). **A 10-g micro-version of the rapid-mix-test.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 134-136 (De)

A micro-baking test for 10-g flour (MRMT) was developed which corresponds to the standard baking test (RMT) as far as technically possible with respect to formula, preparation and processing of the dough. It was shown for 31 winter wheat var. (harvest 1990) from one location in Bavaria that the bread volumes obtained by MRMT and RMT are highly correlated ($r = 0.904$). The properties of dough and bread can also be judged very well by the MRMT. AA

Bread

309

Antuna (B) and Martinez-Anaya (MA). **Sugar uptake and involved enzymatic activities by yeast and lactic acid bacteria: Their relationship with breadmaking quality.** *International Journal of Food Microbiology* 18(3); 1993; 191-200

This paper reports information on the uptake mechanisms for the main sugars (maltose, sucrose, glucose and fructose) present in wheat

doughs, by yeast strains (*Saccharomyces cerevisiae*, *Candida guilliermondii* and *Sacch. fructuum* and lactic bacteria (*Lactobacillus plantarum*, *Lact. brevis*, *Lact. cellobiosus*, *Enterococcus faecium* and *Leuconostoc mesenteroides*) isolated from wheat doughs. The activity of the enzymes α -glucosidase and β -fructosidase involved in the metabolism of these sugars is also determined. *Sacch. cerevisiae*, *C. guilliermondii*, *Lact. plantarum* and *L. brevis* showed good performance, while *L. cellobiosus* and *E. faecium* and *Sacch. fructuum* yielded bread of lower quality. *Leu. mesenteroides* used in combination with other strains led to high quality starters. All yeast strains assimilated glucose, fructose and maltose (saturable kinetics). Lactic acid bacteria showed saturable kinetics only for hexose, while disaccharide uptake was linear. These results indicate good correlation between the parameters evaluated and bread making potential of the microorganisms. SRA

MILK AND DAIRY PRODUCTS

310

Jacquet (Ch), Rocourt (J) and Reynaud (A). **Study of *Listeria monocytogenes* contamination in a dairy plant and characterization of the strains isolated.** *International Journal of Food Microbiology* 20(1); 1993; 13-22

Three hundred and forty samples were analysed for the presence of *Listeria* 44 *L. monocytogenes* and 17 *L. innocua* were isolated from 4 var. of cheese, cheese brines, process equipment and plant environment. *L. monocytogenes* strains were recovered during the ripening and rind washing stages. The characterization of the isolated *L. monocytogenes* strains by serotyping and phage typing showed different serovars and phagovars. Some strains with the same serovar and phagovars were isolated from cheeses and process equipment indicating that cheese contamination occurs during ripening. Only one profile was found from the analysis of the ribonucleic acid gene restriction patterns of 38 *L. monocytogenes* strains with different serovars and phagovars, suggesting that all *L. monocytogenes* strains isolated in the dairy

plant could have been derived from a single ancestral group. SRA

Milk

311

Kadan (RS), Ziegler (GMJr), Bett (KL), Grimm (CC), Vercellotti (JR), Wan (PJ). **Stability of dried filled milks.** *Journal of Food Science* 58(6); 1993; 1294-1299

Samples of dried filled milk (DFM) were made with several vegetable fats and compared with dried milk. Several specially prepared vegetable oils, such as Trisun HS-500, hydrogenated cottonseed oil and hydrogenated coconut oil could impart stability to the DFM as high as that imparted by milk fat to conventional dried milk. Stability could be further enhanced by appropriate antioxidant and storage conditions. The simple technique of measuring oxygen consumption by the DFM was as effective as flavour evaluation, GC of volatiles, or spectroscopy for screening large numbers of samples or as a quality control procedure. AA

312

Imafidon (GI) and Farkye (NY). **Rennet coagulability of high-heat treated milk influenced by time of pH adjustment.** *Journal of Food Science* 58(6); 1993; 1300-1302

The coagulability of high-heat treated (91°C for 16 or 60 sec) milk was measured with a Formagraph. Coagulation (hysteresis) and curd formation by such milk was increased by direct acidification to pH < 6.4 before rennet addition. Coagulation properties were increased greatly when such milk was pH-cycled (i.e., acidified to pH 5.5, held overnight at 4°C, then neutralized to pH 6.2 - 6.4) before rennet addition. AA

313

Siva (CV), Patel (DA) and Sannabhadri (SS). **Microbiological status of raw and pasteurized milk.** *Indian Journal of Dairy Science* 46(2); 1993; 62-66

The microbiological status of raw milk at various stages (individual producers, collection

centres and dairy plant) of collection and of pasteurized milk was investigated. The microbiological quality of raw milk samples was far from satisfactory. The pasteurized milk samples was found satisfactory. The high counts in raw milk samples indicate unhygienic practices of production and handling at farm and during transportation. SRA

314

Ehsani (MR), Schmidt (RH) and Myers (PO). **Effects of cottage cheese whey on the properties of ice milk.** *Journal of Food Quality* 16(4); 1993; 253-261

Liquid cottage cheese whey levels 16, 31, 46 and 61% were used to produce slightly acidic ice milk mixes. Whey levels 46 and 61% reduced the sensory acceptance of the ice milk and also resulted in precipitation problem. Cottage cheese whey level from 0 to 31% did not significantly influence the consistency index (k) of the ice milk mix but the ice mixes exhibited pseudoplastic behaviour (n value less than unity). Cottage cheese whey level 16% resulted in slightly higher overrun than 0% and 31% but the sensory quality (flavour, texture, sourness) was comparable to the control. 46% panelists preferred control, 32.5%, 16% and 21.5%, 31% whey formulations. SD

315

Chawan (CB), Penmetta (PK), Veeramachaneni (R) and Rao (DR). **Liposomal encapsulation of β -galactosidase effect of buffer molarity, lipid composition and stability in milk.** *Journal of Food Biochemistry* 16(6); 1993; 349-357

Lactose hydrolysis was negligible in milk containing liposomes with bacterial β -gal, while there was significant (25) hydrolysis of lactose in milk containing liposomes with fungal β -gal during 20 days of storage at 4°C. Results of this study suggest that liposomes containing β -gal can be prepared and added to milk without affecting the lactose content for up to 20 days of refrigeration (4°C). BV

316

Intveld (PH), Soentoro (PSS) and Notermans (SHW). **Properties of *Bacillus cereus* spores**

in reference materials prepared from artificially contaminated spray dried milk. *International Journal of Food Microbiology* 20(1); 1993; 23-36

317

Jeurnink (TJM) and De Krul (KG). **Changes in milk on heating: viscosity measurements.** *Journal of Dairy Research* 60(2); 1993; 139-150

Skim milk was heated at 85°C for different holding times. Due to heating, whey proteins, in particular β -lactoglobulin, denatured and associated with casein micelles. The casein micelles became larger after heating and acquired mutual attraction. GS

318

Mottar (J), de Block (J), Merchiers (M), Vantomme (K) and Moermans (R). **Routine limulus amoebocyte lysate (LAL) test for endotoxin determination in milk using a toxinometer ET-201.** *Journal of Dairy Research* 60(2); 1993; 223-228

A rapid method of performing the Limulus amoebocyte lysate (LAL) test in milk is proposed using the Toxinometer ET-201. This instrument measured the increase in turbidity due to the interaction between the endotoxins of the Gram negative bacteria and the LAL reagent, monitored the ratio R_1 of the sequential to the initial transmission at 12 sec intervals and quantified endotoxins by detn. of the reaction time T_r required to obtain a 5% decrease in R_1 . There was a good correlation between the toxinometrically determined endotoxin concn. and the number of Gram-negative bacteria (SD, 0.18 log (plate count units)), and the repeatability (CV, 6-10%) was high. The assay may be useful for screening raw materials for UHT milk production, as the endotoxin content of the raw material is related to the rest proteinase activity in the UHT milk. AA

319

Vidal-Valverde (C) and Redondo (P). **Effect of microwave heating on the thiamin content of cow's milk.** *Journal of Dairy Research* 60(2); 1993; 259-262

Three types of commercial ultra high temp. (UHT) milk containing different levels of fat (1) whole milk 3.43% (2) low-fat milk 1.46% and (3) skim milk 0.10% were studied under two different conditions of microwave heating. There was a decrease in milk thiamin due to microwave heating. After reaching a temp. of 53°C (2 min heating), the percentage of thiamine fell to 75.8% for whole milk, 53.8% for low-fat milk and 51.2% for skim milk. Losses of thiamin were greater when heating time increased to 4 min (79°C). The values for thiamin retention were 45.4, 38.5 and 34.1% for whole, low-fat and skim milk respectively. Milk fat helps to prevent the destruction of thiamin through heating. GS

Milk products

320

Henle (T), Walter (AW) and Klostermeyer (H). **Detection and identification of the cross-linking aminoacids N ϵ - and N θ -(2'-amino-2'-carboxy-ethyl)-L-histidine ("histidino alanine", HAL) in heated milk products.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 114-117

An unknown ninhydrin positive compound X, was detected in acid hydrolysates of heated skim milk samples by amino acid analysis, eluting between phenyl-alanine and pyridosine in the chromatogram. The formation of X correlated with heating time and temp., preparative ion-exchange chromatography enabled the isolation of X and a second minor compound from a milk protein hydrolysate and from a model mixture consisting of N α -acetylhistidine and methyl -2 -acetamido acrylate (acetyldehydro alaninmethyl ester), in a relative abundance of 8 to 1. By ¹H-NMR spectroscopy, the two compounds could be identified as the N ϵ - and N θ -isomers of N-(2'-amino-2'-carboxy-ethyl)-L-histidine (histidinoalanine), a cross-link amino acid that has not been described in food proteins up to now. In a number of foods containing milk protein, the N ϵ -histidinoalanine contents were between 50 and 1800 mg/kg protein, which is in a concn. range comparable to the potential nephrotoxic cross-link lysinoalanine, which was determined simultaneously. AA

321

Lametti (S), Giangiacomo (R), Messina (G) and Bonomi (F). **Influence of processing on the molecular modifications of milk proteins in the course of enzymic coagulation.** *Journal of Dairy Research* 60(2); 1993; 151-159

Thermal treatment of milk appeared to affect the accessibility of casein to enzyme action, while homogenization influenced the rate of cooperative aggregation of casein subjects to proteolysis. BV

Cheese

322

Butikofer (U), Ruegg (M) and Ardo (Y). **Determination of nitrogen fractions in cheese: Evaluation of a collaborative study.** *Lebensmittel-Wissenschaft und - Technologie* 26(3); 1993; 271-275

This study was carried out within the framework of the European COST 902/FLAIR-programme (European Cooperation in the Field of Scientific and Technical Research). The first objective was the harmonization of certain techniques currently used for the detn. of nitrogen fractions of cheese. The second objective was to determine the repeatability (r) and reproducibility (R) of the standardized methods including the detn. of total nitrogen (TN), water soluble nitrogen (WSN), nitrogen soluble at pH 4.4 (SN 4.4), ethanol soluble nitrogen (ESN), nitrogen soluble in trichloroacetic acid (TCA 12-N) and nitrogen soluble in phosphotungstic acid (PTA-N). The r- and R-values for TN were in the range of 0.3 to 1.4 and 1.4 to 2.5 g/kg, respectively. For all other methods tested, the r-values in the range of 0.1 to 1.1% of TN, the R-values were below 3.3% of TN except for ESN (5%). For most cheeses tested, the WSN and SN 4.4 results were highly correlated, as were the TCA12-N and ESN results. Therefore, only a limited number of methods should be applied in practice, other aspects should be considered such as practical and environmental aspects (e.g. toxicity of solvents) and future use of the fractions and the kind of cheese. The difference between the TCA12-N and PTA-N values as well as the difference between SN 4.4 and TCA12-N

values were used to characterize protein breakdown. AA

323

Abou-Zeid (NA). **High-fat spreadable processed cheese for people with high blood cholesterol.** *Journal of Dairy Research* 60(2); 1993; 239-245

Part of the raw cheese base used for manufacturing high-fat processed cheese spread was replaced by cows' (C) or buffalo (B) butter residue at level of up to 20%. These residues were produced during the conversion of butter to butter oil by traditional moderate (T) or severe (M) heat treatments. The hypocholesterolaemic properties of butter residues incorporated into processed cheese were tested with rats (serum and liver cholesterol) and human beings (serum cholesterol). When rats were given the control cheese with no butter residue there were significant increases in both serum and liver cholesterol compared with rats given stock diet. However, when part of the raw cheese base was replaced by butter residue these rises were reduced by amounts proportional to the level of butter residue. The hypocholesterolaemic properties of the residues were in order CT > BT, CM > BM, and incorporations of 10% CT, 15% BT, 15% CM and 20% BM were found to nullify the hypercholesterolaemic effects of control cheese and restore cholesterol levels to their normal values. A small human trial gave similar results. Incorporation of butter residue slightly affected the chemical composition of the cheeses. Fat content and pH were little different; however, cheeses with butter residue tended to have higher total protein but lower soluble protein, tyrosine and tryptophan, and total volatile fatty acids. Rheological properties were not altered significantly. Incorporation of butter residue improved the organoleptic properties, particularly flavour intensity. Storage at 5°C for 2 months did not alter the organoleptic properties and changes in chemical composition followed the normal pattern. AA

Camembert cheese

324

Lesage (L), Vailley (A), Lorient (D) and Bezdard (J). **Sodium chloride and magnesium chloride affected by ripening of Camembert cheese.** *Journal of Food Science* 58(6); 1993; 1303-1306

Ripening of cheese with 3 kinds of salt treatment was studied using MgCl₂, NaCl or a mixture of the two. Proteolysis was followed by detn. of TCA-soluble nitrogen and quantitative electrophoresis. A rapid one-step method for free fatty acids was used to determine short and long-chain fatty acids. In the presence of Mg, proteolysis increased, even with NaCl, which seemed to delay the Mg activation. Lipolysis was retarded by NaCl, which decreased the level of free fatty acids. An imbalance between proteolysis and lipolysis could be responsible for the unpleasant flavour of the cheese containing both MgCl₂ and NaCl. AA

Cheddar cheese

325

Bouzas (J), Kantt (CA), Bodyfelt (FW) and Torres (JA). **Time and temperature influence on chemical aging indicators for a commercial Cheddar cheese.** *Journal of Food Science* 58(6); 1993; 1307-1312, 1331

Chemical indicators of Cheddar cheese like residual lactose, organic acid concn, proteolysis, pH and total acidity were quantified and time-temp. effects were evaluated. Cheese in 18 kg blocks collected after pressing at 30-35°C were cooled rapidly to 12-25°C as small pieces and individually vacuum-wrapped at a local production site. Time by temp. interaction was significant (P < 0.05) for all indicators except lactose, lactic acid and total acidity. GS

326

Jack (FR), Piggott (JR) and Paterson (A). **Relationships between electromyography, sensory and instrumental measures of Cheddar cheese texture.** *Journal of Food Science* 58(6); 1993; 1313-1317

Cheddar cheeses with a wide range of textural characteristics were differentiated using electromyography (EMG), quantitative descriptive profiling and Instron deformation

measurements. Two principal components, accounting for 54% and 24% of the variance in sensory scores respectively, were identified: (1) soft/smooth and hard/coarse, and (2) sticky/mouthcoating and rubbery/chewy. All measured Instron variables discriminated among cheeses and were good predictors of sensory scores. EMG traces of masticatory muscle activity were unique for each subject for different samples, so prediction of sensory perceptions from these data were subject dependent. Correlations between EMG and Instron measurements were observed, but were not consistent from one subject to another. AA

327

Kumar (V) and Tewari (BD). **Effect of processing variables on physico-chemical properties of cheese powder from accelerated ripened Cheddar cheese.** *Indian Journal of Dairy Science* 46(2); 1993; 56-61

This study indicated that the physical quality of cheese powder improved with the increasing total solids of slurry. Addition of trisodium citrate at 3.0% was considered to be the best for manufacturing cheese powder from accelerated ripened cheese. SRA

328

Belitz (H-D) and Kaiser (K-P). **Monitoring Cheddar cheese ripening by chemical indices of proteolysis. 3. Identification of several high-molecular mass peptides.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 118-122

Two Cheddar cheese from 2 different production plants were ripened over 24 wks at 10°C and then analysed for peptides soluble in citrate buffer at pH 4.6 by reversed phase-HPLC. 13 peptides with a chain length of between 35 and 65 amino acid residues and mol. masses between 3800 and 7400 were isolated and assigned to the corresponding amino acid sequences of the casein fractions via Edman degradation and amino acid composition. All peptides were fragments of the region K²⁹ - S⁹⁶ of β -casein A¹ and A², and 11 of them had M⁹³ as the C-terminal. The amounts and proportions of these peptides varied differently during ripening of the 2

cheeses, so they may be suitable markers for characterizing the stage of ripening. AA

Dahi

329

Sharma (NK), Gill (JPS), Joshi (DV) and Kwatra (MS). **Mycoflora of Indian fermented milk product (dahi).** *Indian Journal of Dairy Science* 46(2); 1993; 85-87

Analysis of 106 samples of Indian fermented milk product (dahi) showed moulds and yeasts < log 1/g in 51.8% and 40.6% respectively. 39 (36.8%) samples contained moulds in the range log1 - log 3/g and yeasts in 44 (41.5%) samples. Moulds and yeasts count in the excess of log 3/g were observed in 11.3 and 17.9% of the total samples respectively. The isolates belonged to *Saccharomyces*, *Torulopsis*, *Trichosporon*, *Aspergillus*, *Penicillium*, *Mucor*, and *Fusarium*. SRA

Yoghurts

330

Kneijel (W), Jaros (D) and Erhard (F). **Microflora and acidification properties of yoghurt and yoghurt-related products fermented with commercially available starter cultures.** *International Journal of Food Microbiology* 18(3); 1993; 179-189

Yoghurts and yoghurt-related milk products were produced using 44 commercially available starter cultures from 8 suppliers. The yoghurt starters consisted of the classical yoghurt microflora and the yoghurt-related cultures containing *Lactobacillus acidophilus* and/or *Bifidobacterium* spp. instead of or in addition to the yoghurt bacteria. The counts of lactobacilli in the fresh yoghurts varied between 5.5×10^7 and 6.5×10^8 CFU/ml, and the counts of streptococci varied from 3.5×10^7 to 1.2×10^9 CFU/ml. About 80% of the yoghurts had higher counts of cocci than rods. During storage of the products for 2 wks at 6°C the stability of the microflora differed markedly among the cultures. In the fresh yoghurt-related products the *L. acidophilus* counts ranged from 4.0×10^5 to 2.6×10^8 CFU/ml; bifidobacteria were found at levels between 4.0×10^6 and 2.6×10^8 CFU/ml. In

most products reduced viable counts of these bacteria were observed after 2 wks. Titratable acidity increased on average by 22.3% in the yoghurts, and by 14.9% in the yoghurt-related products during storage. In most products a higher amount of L(+)-than D(-)-lactic acid was found. AA

331

Wacher-Rodarte (C), Galvan (MV), Farres (A), Gallardo (F), Marshall (VME), Garcia-Garibay (M). **Yoghurt production from reconstituted skim milk powders using different polymer and non-polymer forming starter cultures.** *Journal of Dairy Research* 60(2); 1993; 247-254

Using polymer producing (ropy) strains of lactic acid bacteria it was possible to reduce considerably the syneresis of yoghurt, even with 12% total milk solids. The viscosities obtained with these strains were also similar to those obtained using normal strains and milk with 17% total solids content. The concn. of milk and the polymer produced by ropy starters had a synergic effect in increasing viscosity. Polymer production was not affected in most cases by milk concn. One type of ropy culture (Wiesby) seemed to produce a different kind of polymer as it could not be determined by alcohol precipitation, in spite of being able to reduce syneresis and increase viscosity in yoghurt. A limited number of yoghurts were evaluated organoleptically, one prepared with a ropy starter strain (NCFB at 12, 14.5 and 17% total solids) and one prepared with a non-ropy strain (LL-I at 17% total solids). The results suggest that the ropy strain yoghurts had different mouthfeel from the non-ropy strain yoghurts; the most acceptable product overall was the ropy strain made with 12% total solids. AA

MEAT AND POULTRY

Meat

332

Ockerman (HW), Harnsawas (S) and Yetim (H). **Inhibition of papain in meat by potato protein or ascorbic acid.** *Journal of Food Science* 58(6); 1993; 1265-1268

The inhibition of papain activity by ascorbic acid, isoascorbic acid, citric acid and potato protein was evaluated and their utilization for permanent inhibition of papain activity in meat was assessed. Ascorbic acid at 2.5×10^{-3} M level inhibited papain in meat but produced an unacceptable off-flavour. At 2.5×10^{-4} M level papain activity retarded, but not completely and produced more acceptable flavour. Potato inhibitor at 0.6, 0.8 and 1.0 mg/ml did not have a significant influence on papain activity in meat. GS

333

Cofrades (S), Careche (M), Carballo (J) and Colmenero (FJ). **Protein concentration, pH and ionic strength affect apparent viscosity of actomyosin.** *Journal of Food Science* 58(6); 1993; 1269-1272

334

Carballo (J), Solas (MT) and Colmenero (FJ). **Effects of different levels of fat on rheological changes and microstructure of meat batters during heat processing.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 109-113

The influence of fat content (5.3% and 20.8%) on the modulus of rigidity (g) only became evident as gel structures began to form, giving higher G values for meat batters the higher the fat content of the sample. Penetration stress and elasticity increased with increase in temp. (between 40 and 70°C) of the product. The work of penetration increased between 40 and 60°C, and remained steady at higher temp. Increased temp. causes the formation of a matrix structure typical of heat-induced protein gels, which became compact and determine the formation of stronger, more elastic structures. Differences in microstructure caused by fat content were more evident at low temp. (40°C). BV

Beef

335

Davies (JE), Chipman (JK) and Cooke (MA). **Mutagen formation in beefburgers processed by frying or microwave with use of flavouring and browning agents.** *Journal of Food Science* 58(6); 1993; 1216-1218, 1223

336

Brewer (MS) and Wu (SY). **Display, packaging and meat block location effects on colour and lipid oxidation of frozen lean ground beef.** *Journal of Food Science* 58(6); 1993; 1219-1223

337

Shand (PJ), Sofos (JN) and Schmidt (GR). **Properties of alginate/calcium and salt/phosphate structured beef rolls with added gums.** *Journal of Food Science* 58(6); 1993; 1224-1230

338

Schaaake (SL), Means (WJ), Moody (WG), Boyle (EA) and Aaron (DK). **Boning methods and binders affect bind and sensory characteristics of structured beef.** *Journal of Food Science* 58(6); 1993; 1231-1236

339

Merkle (JA) and Larick (DK). **Triglyceride content of supercritical carbon dioxide extracted fractions of beef fat.** *Journal of Food Science* 58(6); 1993; 1237-1240

340

Xiong (YL), Decker (EA), Robe (GH) and Moody (WG). **Gelation of crude myofibrillar protein isolated from beef heart under antioxidative conditions.** *Journal of Food Science* 58(6); 1993; 1241-1244

341

Yin (MC), Faustman (JW), Riesen (JW) and Williams (SN). **α -Tocopherol and ascorbate delay oxymyoglobin and phospholipid oxidation in vitro.** *Journal of Food Science* 58(6); 1993; 1273-1276, 1281

342

Harmayani (E), Sojos (JN) and Schmidt (GR). **Fate of *Listeria monocytogenes* in raw and cooked ground beef with meat processing additives.** *International Journal of Food Microbiology* 18(3); 1993; 223-232

343

Bonsell (T), Andersen (MK) and Rule (DC). **Effect of cooking oil type on final cholesterol content and fatty acid composition of ground beef.** *Journal of Food Quality* 16(5); 1993; 383-391

Pork

344

Bradford (DD), Huffman (DL), Egbert (WR) and Mikel (WB). **Potassium lactate effects on low-fat fresh pork sausage chubs during simulated retail distribution.** *Journal of Food Science* 58(6); 1993; 1245-1248, 1253

345

Cannon (JE), McKeith (FK), Martin (SE), Novakofski (J) and Carr (TR). **Acceptability and shelf-life of marinated fresh and precooked pork.** *Journal of Food Science* 58(6); 1993; 1249-1253

Pigs

346

Boles (JA), Shand (PJ), Patience (JF), McCurdy (AR) and Schaeffer (AL). **Acid base status of stress susceptible pigs affects sensory quality of loin roasts.** *Journal of Food Science* 58(6); 1993; 1254-1257

Rabbit

347

Fernandez-Espla (MD) and O'Neill (E). **Lipid oxidation in rabbit meat under different storage conditions.** *Journal of Food Science* 58(6); 1993; 1262-1264

The thiobarbituric acid reactive substances (TBARS) in raw and cooked rabbit burgers was determined and their susceptibility to oxidative rancidity and warmed-over flavour was evaluated. Mean TBARS values during refrigerated storage for burgers wrapped in polyethylene film and vacuum-packaged burgers were compared. Vacuum packaged burgers had lower ($p < 0.001$) TBARS during refrigerated storage than those wrapped in polyethylene film. TBARS values for rabbit burgers wrapped in polyethylene film were higher ($p < 0.01$) than those of chicken burgers

and increased continually during storage at 4°C. TBARS values for cooked rabbit and chicken burgers at 24 h after cooking were higher ($p < 0.01$) than those for raw burgers. GS

Products

Meat

348

Zhang (M) and Mittal (GS). **Measuring tenderness of meat products by Warner Bratzler shear press.** *Journal of Food Processing Preservation* 17(5); 1993; 351-367

Tenderness of bologna, salami and pastrami was measured by Warner-Bratzler (W.B.) tests. Three samples diameters and 3 crosshead speeds were studied. The samples were ruptured under tension instead of shear; thus, shear force did not increase with the increase in sample diam. at the same cross-sectional area to applied force ratio. Crosshead speed did not affect results of bologna and salami, but affected many parameters of pastrami. Recommended test conditions are: sample diam. 20 mm at any crosshead speed for bologna; 10 to 20 mm sample diam. at any crosshead speed salami; 15 mm sample diam. and 250 mm/min crosshead speed for pastrami. AA

Ham

349

Jantawat (P), Runglerdkriangkrai (J), Thunpithayakul (C) and Sanguandeekul (R). **Effects of initial nitrite level, heating and storage on residual nitrite and spoilage of canned ham roll.** *Journal of Food Quality* 16(1); 1993; 1-11

350

Katsaras (K) and Budras (K-D). **The relationship of the microstructure of cooked ham to its properties and quality.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 229-234

This study examined the influence of salt and phosphate brine as well as tumbling and

heating on the microstructure of cooked hams through scanning electron and transmission electron microscopy. The observed morphologies were used to explain mechanisms of technological, biochemical and quality characteristics of the products. AA

Poultry

Chickens

Broilers

351

Beura (CK), Johri (TS), Sadagopan (VR) and Panda (BK). **Interaction of dietary protein level on dose response relationship during aflatoxicosis in commercial broilers. I. Physical responses, livability and nutrient retention.** *Indian Journal of Poultry Science* 28(3); 1993; 170-177

The effects of interaction between dietary aflatoxin (0.0, 0.2, 0.4, 0.8 and 1.6 p.p.m.) and protein (22, 25 and 27%) levels on physical responses, livability and nutrient retention (dry matter, protein, Ca and P) in commercial broilers were studied. Each diet was given to 3 groups each having 7 chicks. Significant interactions between dietary aflatoxin and protein levels were observed in respect of body wt. gain and feed consumption. Body wt. gain, feed consumption retention of protein, Ca, P and livability at 0.8 p.p.m., while feed efficiency and retention of dry matter at 1.6 p.p.m. were adversely affected. An increase in protein level from 22 to 25 or 27% in aflatoxic diets produced a protective effect against toxicity of aflatoxin in commercial broilers. The apparent effective dose of 0.8 p.p.m. or even higher level of 1.6 p.p.m. was found to be innocuous at higher levels of protein (25 or 27%). These results suggest that dietary protein is one of the variable factors controlling the apparent effective dose of aflatoxin. AA

352

Singh (HS) and Sud (SC). **Effect of diazepam and chlorpromazine on the growth and carcass quality of broiler.** *Indian Journal of Poultry Science* 28(3); 1993; 217-221

Growth promoting activities of two neuroleptic drugs diazepam and chlorpromazine in the broiler ratio were studied. Body wt., total feed consumption, feed efficiency ratio and wt. gain were collected at weekly interval. Both diazepam and chlorpromazine increased the body wt. gains by 24 to 152 g over the control and also improved the feed conversion ratio. Moisture and protein contents of meat did not differ significantly. Chlorpromazine significantly reduced fat %. Diazepam 0.30 mg/kg feed was the best for body wt. hot dressed wt., and ready-to-cook yield. GS

Quail

353

Panda (SK), Singh (RP) and Anand (SK). **Frozen storage stability of fried quail as influenced by polyphosphate and packaging.** *Indian Journal of Poultry Science* 28(3); 1993; 226-232

140, 5 wk old Japanese quail carcasses were battered, deep fat fried, chilled in 0 (control) or 5% sodium tripolyphosphate (STPP) sol. in the ratio of 1.2 (w/v) for 16 h at 5 plus or minus 1°C, packaged in HDPE (330°C) or LDPE (250 G) pouches, frozen (-10°C) and stored for 2 months. Deep fat frying reduced moisture content significantly from 74.2% (raw) to 59.7% (fried) with an increase in crude protein from 19.8 to 26.8% and fat from 4.9 to 10.7%. STPP in cooked meat brought about a significant increase in pH by 0.3 units, reduced shear value and inhibited lipid oxidation during storage. Wt. loss and shear values were lower in HDPE packed than in LDPE packed samples. GS

Turkeys

354

Wang (CH), Booren (AM), Abou-Zied (MM), Pestka (JJ) and Smith (DM). **ELISA determination of turkey roll endpoint temperature: Effects of formulation, storage and processing.** *Journal of Food Science* 58(6); 1993; 1258-1261, 1264

Effects of refrigerated and frozen storage, salt concn., cooking schedule and product diam. were compared on detn. of min. endpoint cooking temp. of turkey breast rolls by

measuring extractable protein (EP), lactate dehydrogenase (LDH) activity and LDH concn. by sandwich enzyme-linked immunosorbent assay. LDH concn. differed in rolls processed to 70.0°C and 71.1°C, whereas EP and LDH activity did not differ at these temp. Salt concn., cooking schedule and product casing diam. did not markedly influence LDH concn. LDH content of uncooked rolls decreased during frozen storage. A max. concn. of 0.31 µg LDH/g meat indicated proper processing. AA

355

Hsieh (YLF), Fields (ML), Huff (HE) and Badding (SL). **Thermal inactivation and injury of *Clostridium sporogenes* spores during extrusion of mechanically deboned turkey mixed with white corn flour.** *Journal of Food Processing/Preservation* 17(5); 1993; 391-403

An extruded mixture of mechanically deboned turkey and white corn flour was used as a model system to study the thermal inactivation and injury of *Clostridium sporogenes* spores. Thermal inactivation was observed at 93.3°C (2 log₁₀ reductions) and 115.6°C (4-5 log₁₀ reduction). Statistical analyses showed that significant difference in thermal inactivation of spores occurred between the extrusion temp. (P < 0.05). *C. sporogenes* spore counts of the extruded sample from a rich protein medium (Brewer Anaerobic Agar) were significantly greater than those from a limiting growth medium (Nutrient Agar) (P < 0.05), indicating that spores surviving severe heat treatments required nutrients not required by unheated spores. *C. sporogenes* spores counts of the extruded sample decreased after 1 and 2 wks of storage under refrigeration conditions. The overall bacteriological quality of the extruded mixture of mechanically deboned turkey and white corn flour was excellent (0 spore/g in both Brewer Anaerobic Agar and Nutrient Agar). AA

Products

Eggs

356

Dyer-Hurdon (JN) and Nnanna (IA). **Cholesterol content and functionality of**

plasma and granules fractionated from egg yolk. *Journal of Food Science* 58(6); 1993; 1277-1281

Non-spray dried (NS) and spray-dried (SD) egg yolk were fractionated into plasma (P) and granules (G) by centrifugation and the cholesterol content and the functionality of the fractions were assessed. Fractionation of NS yolk resulted in fraction yields of 25.3% NSG and 74.7% NSP. Total cholesterol values for NS samples were lowest (P less than or equal to 0.01) for NSG and highest (P less than or equal to 0.01) for NSP compared to that of NS. Fractionation of SD yielded 53.4% of SDG and 46.6% of SDP. The total cholesterol of SDP was significantly lower (P less than or equal to 0.01) than SD cholesterol. Granules from SD had the lowest percent protein and highest percent lipid values, when compared to all other spray dried products. The use of NSG as a replacement for whole yolk on a wt. basis resulted in approx. 30% reduction (P less than or equal to 0.01) in cholesterol, 46% reduction in lipid and 2 fold increase in protein. GS

357

Shukla (PK), Shrivastav (AK), Singh (RP) and Bedi (SPS). Effect of dietary supplementation of zinc on egg production and egg quality characteristics of Japanese quail. *Indian Journal of Poultry Science* 28(3); 1993; 190-194

The effect of dietary supplementation of graded levels of Zn (24, 50, 75 and 100 mg/kg feed) on production performance and egg quality characteristics of Japanese quail was studied. Quadruplicate groups of 6 birds each were assigned to one of the 4 experimental diets from 7th to 19th wk. of age. Feed consumption, egg mass, feed efficiency, hen-day egg production, egg wt., body wt., albumen index, internal quality unit and tibial bone wt., were not significantly affected by dietary Zn levels. % shell wt. was, however, significantly affected by the levels of dietary Zn and its optimum value was recorded at 50 mg/kg level of Zn. Shelf thickness increased with levels of dietary Zn with max. value at 100 mg/kg, which did not differ significantly from that of 75 mg/kg dietary level of Zn. These results suggest that dietary Zn level of 75 mg/kg is perhaps adequate for optimum production performance and egg quality of Japanese quail layers. AA

Egg powder

358

Fontana (A), Antoniazzi (F), Ciavatta (ML), Trivellone (E) and Cimino (G). ¹H-NMR Study of cholesterol autooxidation in egg powder and cookies exposed to adverse storage. *Journal of Food Science* 58(6); 1993; 1286-1290

The effects of heating, diffuse daylight exposure and long-term storage on spray-dried egg powder and commercial cookies were investigated. Autoxidation was quite slow when the sample was stored in a freezer at -20°C. Diffuse day light increased the amounts of β -epoxide of cholesterol, while heating caused a sharp increase in C-7 oxidized cholesterol derivatives. Extent of cholesterol oxidation depended on storage conditions. All cholesterol oxides increased and β -epoxide was the predominant derivatives in aged samples. Only 7-ketocholesterol appeared lower with ageing. The extent and severity of oxidation could be reduced by proper packaging materials. GS

Egg yolk

359

Fichtali (J), Charter (EA), Lo (KV) and Nakai (S). Purification of antibodies from industrially separated egg yolk. *Journal of Food Science* 58(6); 1993; 1282-1285, 1290

An economical (fewer steps, low cost media, energy efficient) easy to scale-up, easily automated purification process is reported. This 3-step process purified antibodies from industrially separated egg yolk use a low cost cation exchanger within an automated liquid chromatography system. This improved the purity from 18 to about 61% and was easy to scale-up, monitor and control. Salt precipitation improved purity to about 95% and higher purities were possible. BV

SEAFOODS

360

Hudson (JA) and Mott (SJ). Growth of *Listeria monocytogenes*, *Aeromonas hydrophila* and

***Yersinia enterocolitica* in pate and comparison with predictive models.** *International Journal of Food Microbiology* 20(1); 1993; 1-11

In this study the growth of the *Aer. hydrophila*, *Y. enterocolitica* and *L. monocytogenes* was measured in a commercially produced pate at 4 and 10°C to represent refrigeration and mild temp. abuse conditions. The kinetic data obtained were then compared to the values predicted by response surface models in order to test the models. Strains of *L. monocytogenes* grew at both temp. The food strain of *Aer. hydrophila* grew only at 10°C, and the type of strain did not grow at either temp. Similarly, the type of *Y. enterocolitica* did not grow at either temp. and the food strain grew at both temp. The measured values of lag and generation time did not correlate with those predicted by response surface models, taken from literature and produced in the lab. Differences in predicted kinetic values from the models indicate that a model for any particular strain may not reflect the growth of naturally occurring contaminants of the same sp. SRA

Crabs

361

Chung (HY) and Cadwallader (KR). **Volatile components in blue crab (*Callinectes sapidus*) meat and processing by-product.** *Journal of Food Science* 58(6); 1993; 1203-1207, 1211

Volatile flavour profiles of fresh-picked blue crab meat and picking-table by-product were studied to assess the potential use of the by-product for flavour recovery by simultaneous steam distillation-solvent extraction/GC/MS. Among 98 compounds identified, 77 were in crab meat and 80 in by-product. 54 were new. Trimethylamine, 4 alkanes (C15-C17, C19), and indole were highest (> 50 ng/g) in crab meat, while trimethylamine, carbon disulphide, dimethyltrisulphide, two alkanes (C15 and C17), geranylacetone, and 1-dodecanol were highest in by-product. 23 compounds were higher in by-product and 7 were higher in meat. Crab processing by-product may be good source for volatile flavour recovery. GS

Oysters

362

Jones (DD), Law (R) and Bej (AK). **Detection of *Salmonella* spp. in oysters using polymerase chain reactions (PCR) and gene probes.** *Journal of Food Science* 58(6); 1993; 1191-1197, 1202

Use of the polymerase chain reaction (PCR) DNA extraction procedure saves time and increases the efficiency of the detection of *Salmonella* in oysters. The procedure which involves modification of the DNA extraction procedure followed by PCR amplification coupled with gene probe hybridization detected < 40 cells of seeded or naturally occurring *Salmonella* sp/g of oyster meat sample. GS

Squids

363

Konno (K) and Fukazawa (C). **Autolysis of squid mantle muscle protein as affected by storage conditions and inhibitors.** *Journal of Food Science* 58(6); 1993; 1198-1202

Cleavage of myosin into heavy and light meromyosin was found during the autolysis of squid mantle muscle conditions for max. autolysis were NaCl concn. 0.3 M, pH 7 and storage temp. 40°C. Storage conditions such as NaCl concn. and temp. affected both the autolysis rate and the products formed. Autolysis was inhibited by EDTA and Na-pyrophosphate at < 25°C and by phenylmethyl extracted from potato tuber at > 35°C. GS

Fish

364

Chapman (KW), Sagi (I), Hwang (KT) and Regenstein (JM). **Extra-cold storage of hake and mackerel fillets and mince.** *Journal of Food Science* 58(6); 1993; 1208-1211

Extra-cold storage (-30 and -40°C) of mackerel (*Scomber scombrus*) mince and fillets showed lower free fatty acid formation. Extra-cold storage (-30°C) of white hake (*Urophycis tenuis*)

fillets produced fish with better quality based on sensory and chemical indices. The colder the storage temp., the less firm the hake mince and fillets. Ascorbic acid accelerated cohesiveness development of mackerel mince and fillets. Over time, the quality of the hake and mackerel decreased according to sensory and chemical indices. They became tougher and generally more cohesive. AA

365

Jose (VT) and Sherief (PM). **Glaze hardener: a new recruit to Indian seafood processing machinery.** *Seafood Export Journal* 25(9); 1993; 7, 9, 10

Glaze hardener is a 'mini freezer' which operates at a temp. of -25°C or below. Marine products immediately after glazing are fed into this machine, which causes the temp. to go below -20°C before packing. Glaze hardner avoids the cold storage problems like slow freezing and clumping, reduces drip loss, prevents dehydration and avoids quality deterioration. GS

366

Mackie (IM). **The effects of freezing on flesh proteins.** *Food Reviews International* 9(4); 1993; 575-610

Theories on the mechanism of protein denaturation and of the action of cryoprotectants are reviewed in this article, and the potential of using the freezing process to form textures from comminuted flesh or protein dispersions is discussed. Aspects covered are fish flesh proteins (structure of muscle, structure of myofibrils, the contractile system of the myofibrils, fish muscle proteins), postmortem biochemical changes in fish muscle, some considerations on the freezing process and frozen storage, evidence for denaturation of fish proteins on freezing and frozen storage (myofibrillar proteins, ATPase activity, sulfhydryl groups, aggregation behaviour of myosin in model systems, hydrophobicity of muscle and extractable protein, solubility of muscle in sodium dodecyl sulfate sol., sarcoplasmic proteins), factors influencing protein denaturation (physical damage caused by ice crystals, enzymic breakdown of trimethylamine oxide, lipids and

their degradation products), nature of the protein denaturation process during frozen storage, stabilization of proteins against frozen storage denaturation and texture formation by freezing. 128 references. SRA

Periwinkle

367

Ariahu (CC), Adebona (MB) and Ogunsua (AO). **Quality changes in tropical periwinkle (*Tympanostomus fuscatus*) during iced storage.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 187-190

Changes in cooked flavour, appearance and mouthfeel/chewiness, tyrosine value (TV), total volatile bases (TVB), non-protein nitrogen (NPN), pH and bacterial flora were evaluated in shucked tropical periwinkle (*Tymp. fuscatus*) meat during iced storage over a period of 16 days. The periwinkle showed a decline in organoleptic quality during storage with concomitant increases in TV, TVB, pH and bacterial counts. The main bacteria isolates which were initially dominated by *Bacillus* spp. (30%) and *Staphylococci* spp. (20%) showed marked succession by *Moraxella* spp. (40%), *Flavobacterium* spp. (25%) and *Pseudomonas* spp. (20%) during spoilage. The shelf-life limit for the shellfish was 6 to 8 days. AA

Salmon

368

Bhattacharya (S), Choudhury (GS) and Studebaker (S). **Hydrothermal processing of pacific chum salmon. Effects on texture and *in vitro* digestibility.** *Journal of Food Quality* 16(4); 1993; 243-251

Texture profile analysis by Instron of Pacific chum salmon (*Oncorhynchus keta*) muscle subjected to hydrothermal treatment ($60 - 100^{\circ}\text{C}$) for 0 - 40 min showed higher hardness, cohesiveness, springiness (elasticity) and chewiness values than the raw muscle. Prolonged heating at higher temp. ($90 - 100^{\circ}\text{C}$) softened the muscle as indicated by decreased texture profile values except cohesiveness. *In vitro* digestibility of heat treated muscle was not different from that of raw muscle. SD

Tuna

369

Banga (JR), Alonso (AA), Gallardo (JM) and Perez-Martin (RI). **Kinetics of thermal degradation of thiamine and surface colour in canned tuna.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 127-131

The kinetics of thermal degradation of thiamine and surface colour (lightness measured as Hunter L-value) in canned white tuna were determined using an unsteady-state experimental procedure. Kinetic parameters were calculated by weighted non-linear regression considering a first-order kinetic model with a dependence of the kinetic coefficient (D) with temp. of the Thermal Death Time (TDT) type. Mass-average retentions of thiamine were calculated using a mathematical model which takes into account the non-uniform and unsteady distribution of temp. inside the container during thermal processing. The high correlation obtained between the predicted and the observed retention values and the small confidence intervals found for the kinetic parameters indicate a high statistical reliability. The kinetic model thus determined permits the simulation and optimization of the process resulting in a better quality of the final product. AA

White fish

370

Hattula (T), Kiesvaara (M) and Moran (M). **Freshness evaluation in European whitefish (*Coregonus wartmanni*) during chill storage.** *Journal of Food Science* 58(6); 1993; 1212-1215, 1236

PROTEIN FOODS

Nil

ALCOHOLIC AND NON-ALCOHOLIC BEVERAGES

Alcoholic beverages

Beer

371

Patzold (R), Fenz (R), Krause (M) and Galensa (R). **Screening method for the detection of maize in beer.** *Deutsche Lebensmittel-Rundschau* 88(12); 1992; 390-391 (De)

A HPLC-method is described, which allows a quick decision about the use of maize as a maltsurrogate in brewing process. Indicator is 1-O-trans-p-Coumaroylglycerol. For clean up, a double step solid phase extraction with RP-18- and ion exchange-cartridges is used. The HPLC separation is carried out with β -Cyclodextrin columns. AA

Wines

372

Hupf (H) and Jugel (H). **Biogenic amines in wine - experiences regarding consumer protection.** *Deutsche Lebensmittel-Rundschau* 88(12); 1992; 382-387 (De)

A review is given about consumer complaints submitted to the Official food control organisation for Southern Bavaria. Health disturbances that supposedly occurred after the drinking of wine are reported. The types of health disturbances are discussed as to their occurrence in white and red wines as well as in domestic wines and wines of foreign origin. In consequence it becomes evident - contrary to the scientific discussion on biogenic amines - that the so-called hangover symptoms occurred mainly after the drinking of white wines. 71 wines from 10 different countries not belonging to the European Community, mainly from South-Eastern Europe were examined for their content of all in all 9 biogenic amines. It is true that red wine shows the highest amine concn., but median values of histamine content are about equal in white and red wines. The wines held responsible for health disturbances did not show significantly high levels of biogenic amines. AA

Soy beverages

373

Anantha Narayanan (KR), Abhay (Kumar) and Patil (GR). **Kinetics of various deteriorative changes during storage of UHT soy beverage and development of a shelf-life prediction model.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 191-197

The shelf-life of UHT (ultra-high temp.) soy beverage stored at 5, 25, 35 and 45°C was determined. Various physicochemical and sensory changes in soy beverage were monitored during storage. The viscosity, proteolysis, lipolysis, oxidation and browning were found to increase and pH, reflectance and sensory scores found to decrease during storage. These changes could be described well with first-order reaction kinetics. The rates of these reactions were found to be highly temp.-dependent, the rates being higher at high temp. The activation energy and other activation parameters such as activation enthalpy, activation entropy and free energy of activation for these reactions were determined. The interrelationships between sensory and physicochemical changes were established. The proteolytic changes (measured in terms of trinitrobenzene sulfonic acid value) alone could explain 97 and 98% variation in flavour and total score of the beverage, respectively. The shelf-life prediction model, based on the kinetic constants and the relationship between sensory and chemical parameters, was developed. AA

Tea

374

Chaudhuri (TC). **Grading and nomenclature of tea.** *Packaging India* 26(4); 1993; 25-26

Grading of tea by taste, dry leaf texture, aroma (dry leaf aroma, infused aroma, liquor aroma), colour (dry leaf colour, infused leaf colour, liquor colour), dry leaf appearance, buyer's reference, general terms, approved grades (orthodox tea, CTC tea, green tea) and future concept of grading tea are dealt in this article. CSA

375

Yanishlieva (NVI) and Kortenska (VD). **On the participation of fatty alcohols in inhibited oxidation of lipids.** *Lebensmittel-Wissenschaft und -Technologie* 95(1); 1993; 35-40

The effect of 1-tetradecanol and 1-octadecanol in concn. of $(0.5 - 9.0) \cdot 10^{-2}$ mol/l on the hydroquinone ($1 \cdot 10^{-4}$ mol/l)-inhibited oxidation of the triacylglycerols of sunflower and olive oils at 80 and 110°C has been investigated along with the role of temp. changes within the range 23-100°C. It is established that fatty alcohols accelerate the inhibited oxidation of lipids by participating in (1) the blocking of the phenolic antioxidant through the formation of a hydrogen bond-based complex and (2) the proceeding of additional reactions such as chain propagation, chain branching chain termination. The alcohol with a shorter chain length leads to the formation of a complex where the bond with the inhibitor is stronger whereas the alcohol with a longer chain length exhibits a higher activity in the elementary reactions of propagation, branching and termination of chains. The type of the lipid substrate is found to cause no qualitative change of the effect of alcohols. It is established that with increasing unsaturation (oxidizability) degree of the lipid substrate the effect of fatty alcohols on the inhibitor efficiency and the rate of inhibiting oxidation increase. The change of temp. has a specific effect on the contribution of the two alcohols to the decrease of the inhibitor efficiency and the increase in the rate of the inhibited process. AA

Fats

376

Behr (VA), Doring (N), Durowicz-Heil (S), Ellenberg (B), Kozik (C), Lohr (Ch), Schmidke (H). **Selective hydrogenation of multi-unsaturated fatty acids in the liquid phase.** *Lebensmittel-Wissenschaft und -Technologie* 95(1); 1993; 2-12 (De)

Fatty acids and esters which contain only one double bond have interesting properties such as high oxidation stability or favourable pour points. For these reasons such products find a broad field of application for instance in the sections cosmetics, textile finishing agents or oilfield chemicals. However, natural fats and oils contain often multi-unsaturated fatty acids such as linoleic and linolenic acid which are able - even in minor amounts - to change substantially the physical and chemical properties of the fatty material. Therefore, a hydrogenation procedure is needed which enables the selective conversion of multi-unsaturated into mono-unsaturated fatty acids without formation of completely saturated compounds. After a review of the general possibilities in selective hydrogenation a new method is described to hydrogenate with solvent-stabilized palladium colloid catalysts. A remarkable high selectivity was obtained applying very mild reaction conditions. By use of the liquid-liquid two phase technique an easy and complete catalyst recycle is possible. AA

Oils

377

Phifer (DWJr) and Costello (CA). **Relationship between oil absorption and microstructure of calendered and non-calendered polyester and polypropylene melt blown material.** *Journal of Food Quality* 16(1); 1993; 25-33

Absorption of coconut and safflower oils was studied using scanning electron microscopy. Non calendered polypropylene (NC-PP 635%) and noncalendered polyester consistently absorbed more oil than calendered polypropylene (366%). Smaller average fibre diam. and greater material thickness provided a significantly larger surface area for the NC-PP material. The same combined with larger interfibre spacing increased oil absorption by NC-PP material. SD

378

Neff (WE), Adolf (RO), Konishi (H) and Weisleder (D). **High performance liquid chromatography of the triacylglycerols of *Vernonia galamensis* and *Crepis alpina* seed oils.** *Journal of the American Oil Chemist's Society* 70(5); 1993; 449-455

The *Vernonia galamensis* oil contained 50% trivernoloyl and 21% diveinoloyllinoleoyl glycerol along with 20% triacylglycerols with one verolic and two other fatty acids. The *Crepis alpina* oil contained 36% tricrepenynoyl and 33% dicrepenynoyllinoleoyl glycerols, 17% triacylglycerols with two crepenynic and one other fatty acid. GS

379

Tang (VL), Bayer (E) and Zhuang (R). **Obtain, properties and utilization of Chinese teaseed oil.** *FAT Science Technology* 95(1); 1993; 23-27 (De)

China is the greatest producer of teaseed oil. Chinese teaseed oil is obtained principally from *Camellia oleifera*, which grows widely in 17 provinces of South-China, rather than from *Camellia sasanqua* or *Camellia sinensis*, which is cultivated for tea. The teaseed oil production in China over the last 5 yrs was about 150,000tons per annum, and was obtained almost exclusively by pressing. The chemical and physical characteristics of Chinese teaseed oil are nearly identical with those of olive oil. Its principal use in China is as an edible oil. After catalytic hydrogenation however it may be used for the production of a cocoabutter substitute. AA

Canola oil

380

Przybylski (R), Malcolmson (LJ), Eskin (NAM), Durance-Tod (S), Mickle (J), Carr (R). **Stability of low linolenic acid canola oil to accelerated storage at 60°C.** *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 205-209

A crude commercial canola oil (Westar) and an oil obtained from a genetically reduced linolenic acid cv., were lab. processed under commercial conditions to finished, deodorized oils. Fatty acid analysis indicated that the linolenic acid content of the low linolenic canola oil (LLCO) was 3.1%, compared to 11.5% for Westar. The LLCO exhibited markedly improved stability during accelerated storage at 60°C (Schaal Oven Test) as evident by negligible changes in chemical indices of rancidity. No significant changes were observed in overall odour

intensity or odour pleasantness for the LLCO over the 12 days storage period, whereas significant changes were found for the Westar oil. Comparison of volatiles produced by these oils during storage confirmed enhanced storage stability of LLCO. AA

SPICES AND CONDIMENTS

Essential oils

Lemon oils

381

Braunsdorf (R), Hener (U), Stein (S) and Mosandl (A). **Comprehensive CGC-IRMS analysis in the authenticity control of flavours and essential oils.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 137-141

The $\delta^{13}\text{C}_{\text{PDB}}$ values of 9 flavour compounds from 5 different lemon oils were determined using GC-isotope ratio mass spectrometry. By definition of a suitable internal isotopic standard (I-IST), the influence of CO_2 fixation during photosynthesis is eliminated. The isotopic effects among genuine monoterpenes are, therefore, limited to the influence of enzymatic reactions during secondary biogenic pathways. Calculating versus nerylacetate as an I-IST yields fruit-specific $\delta^{13}\text{C}$ values for neral and geranial with low standard deviation and seems to be suitable for authenticity control of lemon oils. AA

Spices

Capsicum

382

Yuen (CMC) and Hoffman (H). **New capsicum varieties: Storage suitability and consumer preference.** *Food Australia* 45(4); 1993; 184-187

This paper reports a field and storage trials in 45 new *capsicum* var. and a survey of Western Australian consumers' attitude to *capsicum* quality, size, shape and colour and usage. The

storage life of *capsicum* var. had marketable post-harvest life of about 17 days when stored at 8.5°C . Most consumers liked small-to-medium, flat, round crisp, blemish free red *capsicums*. Only 40% of consumers surveyed indicated that the quality of *capsicum* available was good. About half were prepared to pay a higher price for better quality *capsicums*. *Capsicums* were used for salads and cooking. SRA

Chillies

383

Veeresham (C), Kokate (CK), Venkateswarlu (V) and Ramesh Babu (B). **Influence of DL-dopa and L-tyrosine on bioproduction of capsaicin in callus cultures of *Capsicum annuum* Linn.** *Indian Journal of Experimental Biology* 32(3); 1994; 223-224

Callus cultures of *C. annuum* initiated from hypocotyl proteins of seedlings, maintained on modified MS medium, were sub-cultured onto the same medium supplemented with 50 mg/l each of DL-dopa and L-tyrosine. After 4 wk, the biomass and medium extracted for capsaicin and analysed showed an appreciable change in capsaicin in content due to supplementation of DL-dopa (0.173% mg) and L-tyrosine (0.33% mg) over the control cultures (0.033% mg), was recorded only in the medium indicating its extracellular in vitro accumulation. AA

Coriander

384

Thies (W). **Determination of the petroselinic acid content in seeds of *Coriandrum sativum* by gas liquid chromatography.** *Lebensmittel-Wissenschaft und -Technologie* 95(1); 1993; 20-23

With dimethylsulphide the methylthio-derivatives of unsaturated fatty acid methylesters are readily formed within 30 min at 70°C . Whereas the analysis of oleic and petroselinic acid methyl esters by GLC is very time consuming (separation time: 1 h), their corresponding methylthio-derivatives can be quantitatively determined within 14 min. AA

Cumin

385

Guptha (BM). **Residues of monocrotophos in/on cumin.** *Indian Cocoa, Arecanut - Spices Journal* 16(2); 1992; 57-59

Initial residue of monocrotophos in/on cumin leaves were 5.74 and 8.31 p.p.m. whereas in the whole plants it was 7.68 and 10.47 p.p.m. at 0.04 and 0.06% concn. respectively. Residues reached at safe level and below the detectable level in about 14 and 17 days respectively at both the concn. No residues were detected in the green and dry grains. AA

Ginger

386

Kikuzaki (H) and Nakatani (N). **Antioxidant effects of some ginger constituents.** *Journal of Food Science* 58(6); 1993; 1407-1410

The nonvolatile fraction of the dichloromethane extract of ginger rhizomes exhibited a strong antioxidative activity using linoleic acid as the substrate in ethanol-phosphate buffer sol. The fraction was purified by chromatographic techniques to provide 5 gingerol related compounds and 8 dairylheptanoids. Among them, 12 compounds exhibited higher activity than α -tocopherol. The activity was probably dependent upon side chain structures and substitution patterns on the benzene ring. AA

Pepper

387

Shaji James (P) and Mary Regina (F). **Sun drying characteristics of pepper.** *Indian Cocoa, Arecanut - Spices Journal* 16(2); 1992; 44-46

Karimunda and Panniur - I, two pepper (*Piper nigrum* L.) var. from Kerala, India were subjected to both sun drying and CFTRI method of drying after dipping the fresh berries in boiling water for 1 min. The samples were spread for drying on concrete floor, tarpauline sheets and bamboo mats. Berries lost moisture more quickly in initial stages and during exposure periods. Moisture loss did not

occur after 26 h of exposure to sun. % of extraneous matter was max. in berries dried on bamboo mats. CFTRI method of drying imparted a good colour to the product. GS

SENSORY EVALUATION

388

Ketelsen (SM), Keay (CL) and Wiet (SG). **Time-Intensity parameters of selected carbohydrate and high potency sweeteners.** *Journal of Food Science* 58(6); 1993; 1418-1421

Time-intensity (TI) sweetness curves were generated and ten TI parameters were determined for selected carbohydrate and high potency sweeteners. Samples were evaluated by trained panelists at 5% sucrose equivalency (SEV) in water for sucralose, sucrose, fructose, aspartame, cyclamate, acesulfame-K and saccharin and at 9% SEV in water and a buffered model beverage system for sucralose, sucrose, fructose, aspartame and cyclamate. When compared within each system, differences in temporal properties appeared to be concn. and media dependent. No differences in onset characteristics were observed among equisweet groups. Aftertaste characteristics differed among sweeteners only at 9% SEV in water where high potency sweeteners tended to have somewhat longer after taste than nutritive sweeteners. AA

389

Warmke (R) and Belitz (H-D). **Influence of glutamic acid on the bitter taste of various compounds.** *Zeitschrift Fuer Lebensmittel-Untersch und Forschung* 197(2); 1993; 132-133

The bitter taste of L-valine, L-tryptophan, L-trileucine and a tryptic hydrolysate or α s1-casein was diminished to 17-35% of its original strength by glutamic acid in a molar excess between 0.6 and 14. The bitter taste of compounds from other structural classes was not (naringin, limonin) or not seriously affected by glutamic acid. The maximal effects were decreases in bitterness to 77% (caffeine) and 71% (quinine) of the original value, respectively. The results indicate the existence of various bitter receptors. AA

390

Lawless (HT) and Claassen (MR). **Application of the central dogma in sensory evaluation.** *Food Technology* 47(6); 1993; 139-146

The article suggests that matching test objectives with proper methods, appropriate panelists, appropriate statistical hypotheses and analyses of data will enhance the usefulness of sensory data. CSA

FOOD STORAGE

Nil

INFESTATION CONTROL AND PESTICIDES

391

Weidenborner (M) and Jha (HC). **Antifungal activity of flavonoids and their mixtures against different fungi occurring on grain.** *Pesticide Science* 38(4); 1993; 347-351

Flavone and flavonone showed higher antifungal activity than the hydroxylated flavours on four fungi (*Alternaria alternata*, *Cladosporium herbarum*, *Fusarium oxysporum* and *Trichoderma harzianum*) found in grain. Mixtures containing flavone and 7-hydroxyflavone or flavone, flavanone and flavanol caused higher inhibition of fungal growth than the remaining ones. BV

BIOCHEMISTRY AND NUTRITION

392

Zollner (N). **Familial hypercholesterolemia: 40 years research on this disease.** *Lebensmittel-Wissenschaft und -Technologie* 95(1); 1993; 12-18

393

Cheftel (JC) and Dumay (E). **Microcoagulation of proteins for development of "creaminess".** *Food Reviews International* 9(4); 1993; 473-502

Aspects covered in this article are synthetic or semi-synthetic compounds containing fatty acids, polysaccharide or protein-based products. Commercially available carbohydrate and protein-based fat replacers, preparation and characteristics of protein-based fat replacers (native protein microparticles, formation of protein-polysaccharide complexes, controlled protein precipitation, microcoagulation through thermomechanical processes). 38 references. SRA

394

Aguilera (JM) and Stanley (DW). **The microstructure of food protein assemblies.** *Food Reviews International* 9(4); 1994; 527-550

This paper focusses on the microstructural aspects of some protein assemblies and their relation to processing and functionality. Aspects covered include: disassembly of protein bodies in seeds during aqueous extraction, freeze-texturization and gelation of muscle proteins, formation of large protein aggregates during caking of fish hydrolysate powders, transformation of globular to fibrous aggregates and the role of T_g during extrusion cooking, formation of mixed and filled dairy gels, and kinetics of aggregation of β -lactoglobulin. 64 references. SRA

395

Anantharaman (K) and Finot (PA). **Nutritional aspects of food proteins in relation to technology.** *Food Reviews International* 9(4); 1993; 629-655

This report highlight aspects like proteins and amino acids in nutrition (protein and amino acid requirements, protein and amino acids in foods), protein sources for food applications (new protein foods; potential, some technological successes, new protein resources; their chance of success, some successful product developments, enzymatically modified proteins, chemically modified proteins with desirable functional properties, peptides for intravenous nutrition), influence of technology on protein quality (effects of processing, extrusion cooking, lysine blockage and lysinoalanine formation in milk, instant infant cereals, protein/polyphenol

interactions, microwave processing), biochemical effects (proteins as a main component of the diet and minor protein constituents. 61 references. SRA

396

Kitabatake (N) and Doi (E). **Improvement of protein gel by physical and enzymatic treatment.** *Food Reviews International* 9(4); 1993; 445-471

The possibilities of the use of enzymes for food processing are discussed. Heat treatment (ovalbumin, egg white, other food proteins, melting of the heat-induced ovalbumin gel), enzymatic treatment of food protein (proteolytic enzyme-limited proteolysis by pepsin at pH 4, transglutaminase, other enzymes: phosphatase, glycosidase, and aldehydehydrogenase) are the aspects covered. 40 references. SRA

TOXICOLOGY

397

Hemmen (F), Paraf (A) and Smith-Gill (S). **Lysozymes in eggs and plasma from chicken, duck and goose: Choice and use of mAbs to detect adulterants in "Foie Gras".** *Journal of Food Science* 58(6); 1993; 1291-1293, 1299

Lysozymes from either egg-white or plasma were found to be different by monoclonal antibodies (mAbs). For improving texture of "foie gras" or for economical reasons adulterants such as fresh livers from chicken or turkey or hen egg-white have been used. Duck or goose "foie gras" were not detected by anti-duck lysozyme mAbs, while positive reactions were obtained with anti-hen-egg-white lysozyme (HEWL). Similarly, anti-HEWL mAbs detected chicken or turkey fresh liver in duck or goose "foie gras" even after heating at 80°C. In 110°C-heated "foie gras" only mAbs HyHEL (hybridoma anti-hen-egg-white lysozyme) 5 and HyHEL 10 were effective to detect fresh hen livers. AA

398

Hansen (TJ). **Quantitative testing for mycotoxins.** *Cereal Foods World* 38(5); 1993; 346, 348

The author describes how information obtained by rapid quantitative testing can aid decision making in mycotoxin management. Levels for some specific mycotoxins (aflatoxin, fumonisin, ochratoxin, and zearalenone) which are important for regulatory or toxicology reasons are also detailed in this article. CSA

399

Romer (T) and Maune (C). **A practical approach to mycotoxin quality control.** *Cereal Foods World* 38(5); 1993; 349-350, 352

The quality control tool designed to enable users to minimize problems caused by mycotoxins and the importance of proper sampling and testing procedures are described in this article. CSA

400

Frommberger (R). **Intake of dioxins and furans via paper products intended for direct food contact.** *Deutsche Lebensmittel-Rundschau* 88(12); 1992; 375-381 (De)

Sixteen paper samples meant for direct contact with foods were analysed for the content of polychlorinated dibenzo-p-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs). In all of the samples PCDDs/PCDFs were present in a range from 0.08 ng/kg FHO (Berlin) toxic equivalents (TE) to 7.66 ng/kg TE. Expressed in I-TE, the range was 0.04 to 6.53 ng/kg. Calculated on a surface basis, the contents ranged from 0.03 to 3.94 ng/dm² FHO-TE, or expressed in I-TE, from 0.02 to 3.38 ng/dm². According to these data combined with the estimation of the contact surface of these papers with foods, the estimation of the transfer rate of PCDDs/PCDFs into different foods and the known intake of the foods having contact with these paper products, an attempt was made to estimate the contribution of these paper products to the total intake of PCDDs/PCDFs. According to this study, this contribution may be rather different due to the great differences in PCDD/PCDF content of the

paper products, but should not exceed 5% of the total intake. AA

401

Rangaswamy (JR). Effect of physical attributes of robusta coffee on phosphine residue. *Lebensmittel-Wissenschaft und -Technologie* 26(3); 1993; 210-214

Lower grade Robusta coffee (bulk 63) with broken and holed beans having dark rough surfaced husks, have a higher phosphine (PH₃) residue (0.1820 mg/kg) compared to higher grade beans (bulks 41, 48 and 54). The computed phosphine residue in pre-aired (0.1541 mg/kg) and 1 d aired (0.0675 mg/kg) samples of bulk 63 was less than the corresponding determinable free PH₃ residues (0.1820 and 0.1530 mg/kg respectively), while the computed PH₃ residue in pre-aired beans of bulks 41 (0.1571 mg/kg), 48 (0.1561 mg/kg)

and 54 (0.1635 mg/kg) was more than the corresponding determinable free PH₃ residue (0.0718, 0.0992 and 0.0774 mg/kg respectively). Both pre-aired and 1 d aired samples of bulk 63 attained zero-residue level at 24 d compared to 27 to 33 d by those of bulks 41, 48 and 54, indicating that low grade Robusta coffee beans did not only adsorb large amounts of PH₃ during fumigation but also desorbed faster during storage. Physical attributes had affected the level of free PH₃ residue only. Slightly more inorganic phosphorus residue was found in the beans of bulk 63 compared to that in the other three bulks. AA

FOOD LAWS AND REGULATIONS

Nil

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